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**NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION  
AND ASSESSMENT SCHEME**

**FULL PUBLIC REPORT**

**Polymer in ACS-1016**

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**FULL PUBLIC REPORT****Polymer in ACS-1016****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 Rd SUNSHINE VIC 3020 have jointly submitted a **limited** notification statement in support of their application for an assessment certificate for Polymer in ACS-1016.

**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 end use and import volume have been exempted from publication in the Full Public Report and the Summary Report.

**Marketing Name:** Not marketed separately.

**Number-Average  
Molecular Weight (NAMW):** > 1 000

**Weight-Average  
Molecular Weight:** > 10 000

**Maximum Percentage of Low  
Molecular Weight Species**

**Molecular Weight < 500:** < 5%

**Molecular Weight < 1 000:** < 10%

**Method of Detection and  
Determination:** Infrared (IR) spectroscopy, nuclear magnetic resonance (NMR) spectroscopy, pyrolysis GC/MS and Gel Permeation Chromatography (GPC).

**Spectral Data:** An IR spectrum was provided.

### 3. PHYSICAL AND CHEMICAL PROPERTIES

The polymer is imported and is the main component at approximately 50% in solution with propylene glycol monomethyl ether (PGME). The properties listed below are for the notified polymer except for appearance, which is for the imported solution.

<b>Appearance at 20°C &amp; 101.3 kPa:</b>	The resin solution as imported is a yellow, clear solution.
<b>Boiling Point:</b>	Not determined for the notified polymer. Will decompose before boiling.
<b>Specific Gravity:</b>	1 140 kg/m <sup>3</sup> (notified polymer).
<b>Vapour Pressure:</b>	Not determined.
<b>Water Solubility:</b>	0.06% w/w (notified polymer). Water immiscible and forms coagulated layer on surface of water.
<b>Partition Co-efficient (n-octanol/water):</b>	Not determined.
<b>Hydrolysis as a Function of pH:</b>	Not determined.
<b>Adsorption/Desorption:</b>	Not determined.
<b>Dissociation Constant:</b>	Not determined.
<b>Flash Point:</b>	Not determined.
<b>Flammability Limits:</b>	Not flammable.
<b>Autoignition Temperature:</b>	Not determined.
<b>Explosive Properties:</b>	Not determined.
<b>Reactivity/Stability:</b>	The notified polymer is expected to be stable.

#### 3.1 Comments on Physico-Chemical Properties

The notified polymer is never isolated from solution in PGME. It was tested for water solubility using a FTIR (Fourier Transform/Infrared) technique. Results show that the polymer is minimally soluble in water. It is noted that the representative structure contains some hydroxyl and polar oxygen and phosphorus atoms that would aid water solubility.

The polymer is not expected to undergo hydrolysis in the environmental pH range of between 4 and 9 due to the expected low water solubility.

No information is available for adsorption/desorption. The notifier predicts that the mobility of the chemical will be low due to its high molecular weight and states that it may adsorb onto soil particles.

Liquid formulations of the polymer are acidic. The dissociation constant for the polymer has not been determined and would vary according to the phosphoric acid content of the polymer.

#### **4. PURITY OF THE CHEMICAL**

<b>Degree of Purity:</b>	Approximately 99%
<b>Hazardous Impurities:</b>	Maximum residual of 0.1% of the hazardous monomers.
<b>Non-hazardous Impurities (&gt; 1% by weight):</b>	None
<b>Maximum Content of Residual Monomers:</b>	0.7%
<b>Additives/Adjuvants:</b>	PGME (CAS No. 107-98-2) at approximately 50%. Toxic effects (Sax & Lewis, 1996): moderately toxic by intravenous route; mildly toxic by ingestion, inhalation and skin contact; human systemic effects by inhalation: general anaesthesia, nausea; skin and eye irritant; experimental teratogen; many glycol ethers have dangerous human reproductive effects.

#### **5. USE, VOLUME AND FORMULATION**

The notified polymer is used as a component of an industrial spray paint. It is to be imported as a 50% solution in PGME and is formulated into a water-based paint formulation at 0.2 – 1% (w/w). Less than 10 tonnes of the notified polymer in 200 L drums will be imported per year for the first 5 years.

#### **6. OCCUPATIONAL EXPOSURE**

##### **Import, Transport and Storage**

The final paint containing the notified polymer will be manufactured at the notifier's plant. Dockside and transport personnel may be exposed to the notified polymer. However, since the polymer is imported in 200 L sealed drums, exposure to the notified polymer during import and storage would be considered low and would only be envisaged following accidental puncture of the drums.

##### **Manufacture of Paint**

During manufacture of paint comprising up to 1% of the notified polymer, a maximum of 10 workers potentially may be exposed each for 8 hours per day for 35 - 45 days per year. The blending, filtration and storage of the final paint in 200 L drums are conducted under local exhaust ventilation. The dilution of the polymer with other paint ingredients, the nonvolatile nature of the polymer and the engineering controls used to limit exposure makes inhalation exposure at this stage unlikely. However, there is the potential for spillage during decanting, mixing and filling procedures and occupational exposure to the notified polymer may occur, predominantly via the skin. Repairs and maintenance, involving 2 workers for 1 hour/day, 5 days/year, may be necessary during paint production during which the affected part of the system is cleaned. To control exposure, workers will wear impervious gloves, coveralls, footwear and eye protection.

Personnel involved in internal transport of drummed polymer (0.5 hr/day, 70 days/year) or storage of the finished product (8 hr/day, 365 days/year) are unlikely to be exposed except in the case of accidental rupture of containers.

### **Laboratory Testing**

Laboratory testing of the paint may be carried out, and 4 workers may be exposed each for 2 - 4 hours per day for 10 days per year if troubleshooting or 1 hour per day, 210 days year for standard quality checks. Worker exposure to the notified polymer and other paint ingredients in the laboratory environment is controlled through the use of ventilated fume cupboards and personal protective equipment consisting of coveralls/laboratory coats, impervious gloves and eye wear.

### **End Use (Paint Application)**

The final paint coating will be sold and shipped in 200 L drums by road transport to a small number of automotive equipment manufacturers who will apply the coating by manual and automatic electrostatic atomised spray application techniques. Most of the spray application is automatic and any manual application required will take place in spray booths. The notifier has identified a maximum of 20 workers involved in mixing and adding the final paint coating to a closed loop paint storage/circulation tank. These same workers are responsible for periodic sampling and spray painting and are potentially exposed for 8 hours per day for 210 days per year. Approximately 5 – 10% of the paint solids from overspray will be disposed of by the applicator.

Personnel involved in internal transport of paint (2 hr/day, 210 days/year) or storage of the paint (8 hr/day, 210 days/year) are unlikely to be exposed except in the case of accidental rupture of containers.

Coating of automobile components will be conducted in a laminar flow downdraft spray booth designed to rapidly remove aerosol particles and solvent vapour from the atmosphere. The down draft ensures that any overspray is forced into the flooded floor area at the bottom of the spray booth. The water is pumped to the waste paint collection system. Control of the application process is done from a module outside of the spray area and no personnel are exposed to paint overspray.

Spray painters are expected to wear personal protective equipment consisting of impervious overalls, calico hoods, cartridge type respirators and nylon gloves conforming to the relevant

Australian Standards as required.

After application of the paint coating, the automotive components are heated to cure the coating to form a stable film. After this stage, the notified polymer is essentially immobilised within a resin matrix and not available for exposure to workers.

## 7. PUBLIC EXPOSURE

The notified polymer will not be available to the public.

It is expected that during transport, formulation, storage and use of the notified polymer exposure of the public will be low. The most likely scenarios for public exposure would be following an accidental spill during road transport or dermal contact with dried paint films. However, the paint film is inert, high molecular weight, firmly adhered to the substrate and overcoated by topcoats all of which serve to limit dermal exposure.

## 8. ENVIRONMENTAL EXPOSURE

### 8.1 Release

There is potential for loss of the notified polymer during paint manufacture due to spills, drum residuals and equipment cleaning. All storage areas are bunded and sealed, and the other areas are at least sealed. The notifier has indicated the following estimates of monthly amounts of waste polymer generated at various stages in the paint production process and during use:

Source	kg waste/month	kg polymer/year
Polymer solution spills or leaks	2	24
Filter residues	≤ 0.1	≤ 1.2
Wash solvent residue	≤ 0.1	≤ 1.2
Drum residues	≤ 0.01	≤ 0.12
Rejected product during paint manufacture (10 to 30 batches)	250	250 x 1% x 12 = 30
Waste flocculated paint after application	400	400 x 1% x 12 = 48
<i>Loss during use*</i> Over-spray		1 000
TOTAL (max)		1 104 kg (approximate)

\* the notifier indicated a transfer efficiency of approximately 80% with electrostatic spray painting with over-spray being caught in the spray booths filters and water trap.

The overall maximum release of polymer is expected to be approximately 1.1 tonne/year with all of this waste material being disposed of by licensed waste contractors to landfill.

## **8.2 Fate**

The final fate of the polymer will be the same as the coated article, ie either recycled or in landfill. During the recycling process the coating incorporating the polymer will either be removed and become part of a solid/sludge waste that will go to landfill or for incineration, or destroyed in a process such as smelting. Incineration of the paint film liberates noxious fumes including oxides of carbon and nitrogen.

The solid waste generated during manufacturing and application will be disposed to landfill. Leaching of the polymer from landfill is unlikely due to its low water solubility and likely affinity for soil.

The polymer is not expected to cross biological membranes due to its high molecular weight and moderate solubility, and therefore should not bioaccumulate (Connell, 1989).

## **9. EVALUATION OF TOXICOLOGICAL DATA**

No toxicological data were provided.

## **10. ASSESSMENT OF ENVIRONMENTAL EFFECTS**

No ecotoxicological data were provided.

## **11. ASSESSMENT OF ENVIRONMENTAL HAZARD**

Once the paint is applied, the polymer is incorporated into an inert film and should not present an environmental hazard. Any chips, flakes or fragments formed by mistreatment or general wear and tear will be inert. The paint will slowly deteriorate due to exposure to UV light and the other elements, but environmental exposure from this will be insignificant.

The majority of the approximately 1.1 tonne/year of polymer waste will be generated during the manufacture and use of the coatings. This waste will be disposed of to landfill or by incineration. The uncured polymer is unlikely to leach from landfill. The majority of the polymer will be present within the cured inert coating matrix and unavailable for leaching.

The environmental hazard posed by this polymer is considered to be low.

## **12. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY EFFECTS**

### **Hazard assessment**



The notified polymer has a NAMW of greater than 1 000, contains low levels of residual monomers and low levels of low molecular weight species. In addition, the polymer does not contain reactive functional groups identified as of medium or high concern. Therefore, the notified polymer is likely to be of low hazard.

The notified polymer is imported as a 50% solution in PGME. This solvent has a NOHSC exposure standard of 100 ppm TWA and 150 ppm STEL (National Occupational Health and Safety Commission, 1995). The exposure standards are based on the ACGIH TLV recommendations (ACGIH, 2000). These recommendations were arrived at by consideration of the levels at which odour was objectionable and at which eye irritation (lacrimation) occurred. PGME is not listed on the NOHSC *List of Designated Hazardous Substances* (National Occupational Health and Safety Commission, 1999a). Potential adverse health effects listed in the Material Safety Data Sheet (MSDS) for ACS 1016 relate to the solvent and not to the polymer. The imported solution containing the notified polymer is a class 3 Dangerous Good (Flammable Liquid) in accordance with the Australian Code for the Transport of Dangerous Goods (Federal Office of Road Safety, 1998).

### **Occupational health and safety**

As the notified polymer can be predicted to be of low concern, handling of the polymer itself involves a low risk of adverse health effects to workers involved in transport, storage, use or disposal of the imported polymer solution (containing the notified polymer at a concentration of 50%). Therefore, no specific risk reduction measures are required for the polymer itself. However, the imported polymer solution should be assumed to be irritating to eyes and to have an objectionable odour as a result of the solvent content. No information is available on the formulation of the paint manufactured from the polymer solution.

Spillage during transport and storage of the drums in which the polymer solution is imported is unlikely. Therefore, the risk of eye irritation to workers is low.

Manufacture of the paint containing the notified polymer at a concentration of up to 1% involves transfer of the imported polymer solution to a mixing vessel, other additions, blending, drum filling and paint storage. Inhalation exposure to the polymer is unlikely and exposure to PGME is controlled by the use of local exhaust ventilation. Nevertheless, it is the responsibility of the employer to maintain the atmospheric levels of solvents below the national exposure standards. There is potential for dermal exposure to the imported polymer solution during paint manufacture, system maintenance and laboratory testing but the risk of adverse health effects to workers is low.

Spray painting involves mostly automatic spraying of the paint as a fine mist onto a substrate. In this case spraying is electrostatic and is conducted remotely by workers. The hazards of concern to spray painters will generally result from exposure to solvents contained in the paint. In addition to these hazards the risk of fire or explosion is somewhat greater than in non-electrostatic spraying. This necessitates the use of correctly designed spray booths as described in Australian/New Zealand Standard (AS/NZS) 4114:1995 (Standards Australia/Standards New Zealand, 1995a, 1995b) and risk minimisation strategies as comprehensively described in NOHSC *National Guidance Material for Spray Painting* (National Occupational Health and Safety Commission, 1999b). For electrostatic spraying, personal protective equipment (PPE) including an air supplied respirator with a face shield, impervious gloves and protective clothing will be necessary if contact with paint is likely to

occur. Similar PPE is required during solvent cleaning of spray equipment. Once the paint is cured by baking, there is no risk of adverse health effects to workers coming in contact with the painted surface.

## **Public health**

The public can potentially come into contact with the notified polymer in the event of accidental spillage during transport of the imported polymer solution and when it is a component of a hard film on automobiles. There is no risk to public health arising from these scenarios.

## **13. RECOMMENDATIONS**

To minimise occupational exposure to the notified polymer the following guidelines and precautions should be observed:

- The paints containing the notified polymer should be applied in accordance with the National Guidance Material for Spray Painting (National Occupational Health and Safety Commission, 1999b);
- Employers should ensure that NOHSC exposure standards for all of the components of the final paint mix are not exceeded in the workplace;
- Safety goggles, chemical resistant industrial clothing and footwear and impermeable gloves should be used during occupational use of 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.
- Guidance in selection of goggles 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/NZS 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).
- Spillage of the notified chemical should be avoided. Spillages should be cleaned up promptly with absorbents which should 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* (National Occupational Health and Safety Commission, 1999c), workplace practices and control procedures consistent with State and Territory hazardous substances regulations must be in operation.

## **14. MATERIAL SAFETY DATA SHEET**

The MSDS for the imported polymer solution was 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).

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. REQUIREMENTS FOR SECONDARY NOTIFICATION**

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

## **16. REFERENCES**

ACGIH (2000) TLVs and other Occupational Exposure Values – 2000.

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.

Federal Office of Road Safety (1998) Australian Code for the Transport of Dangerous Goods by Road and Rail. Australian Government Publishing Service, Canberra.

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 (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, Canberra.

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National Occupational Health and Safety Commission (1999b) National Guidance Material for Spray Painting. Australian Government Publishing Service, Canberra.

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Sax N I, and Lewis R J. (1996) Dangerous Properties of Industrial Materials. Van Nostrand Reinhold, New York.

Standards Australia (1990) Australian Standard 3765.2-1990, Clothing for Protection against Hazardous Chemicals Part 2 Limited protection against specific chemicals. Standards Association of Australia.

Standards Australia (1994) Australian Standard 1336-1994, Eye protection in the Industrial Environment. Standards Association of Australia.

Standards Australia/Standards New Zealand (1992) Australian/New Zealand Standard 1337-1992, Eye Protectors for Industrial Applications. Standards Association of Australia/Standards Association of New Zealand.

Standards Australia/Standards New Zealand (1994a) Australian/New Zealand Standard 2210-1994, Occupational Protective Footwear. Standards Association of Australia/Standards Association of New Zealand.

Standards Australia/Standards New Zealand (1994b) Australian/New Zealand Standard 1715-1994, Use and Maintenance of Respiratory Protective Devices. Standards Association of Australia/Standards Association of New Zealand.

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Standards Australia/Standards New Zealand (1995a) Australian/New Zealand Standard 4114.1-1995, Spray painting booths - Design, construction and testing. Standards Association of Australia/Standards Association of New Zealand, Sydney/Wellington.

Standards Australia/Standards New Zealand (1995b) Australian/New Zealand Standard 4114.2-1995, Spray painting booths - Selection, installation and maintenance. Standards Association of Australia/Standards Association of New Zealand, Sydney/Wellington.

Standards Australia/Standards New Zealand (1998) Australian/New Zealand Standard 2161.2-1998, Occupational protective gloves, Part 2: General requirements. Standards Association of Australia/Standards Association of New Zealand.