

File No: NA/393

Date: August 1996

**NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION  
AND ASSESSMENT SCHEME**

**FULL PUBLIC REPORT**

**POLYMER IN DESMOPHEN TP LS 2971**

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For Enquiries please contact the Administration Coordinator at:

**Street Address:** 92 Parramatta Rd Camperdown, NSW 2050, AUSTRALIA

**Postal Address:** GPO Box 58, Sydney 2001, AUSTRALIA

**Telephone:** (61) (02) 9577-9466 **FAX (61) (02) 9577-9465**

Director  
Chemicals Notification and Assessment

## **FULL PUBLIC REPORT**

### **POLYMER IN DESMOPHEN TP LS 2971**

#### **1. APPLICANT**

Bayer Australia Ltd of 875 Pacific Hwy PYMBLE NSW 2073 has submitted a limited notification statement in support of their application for an assessment certificate for Polymer in Desmophen TP LS 2971.

#### **2. IDENTITY OF THE CHEMICAL**

Polymer in Desmophen TP LS 2971 is not considered to be hazardous based on the nature of the chemical and the data provided. Therefore the chemical name, molecular and structural formulae, molecular weight and details of the polymer composition have been exempted from publication in the Full Public Report and the Summary Report.

<b>Trade names:</b>	Desmophen TP LS 2971 is the notified chemical in 20% butyl acetate
<b>Number-average molecular weight:</b>	1700
<b>Weight-average molecular weight:</b>	7700
<b>Maximum percentage of low molecular weight species (molecular weight &lt; 1000):</b>	14%
<b>Method of detection and determination:</b>	Infrared spectroscopy
<b>Spectral data:</b>	Infrared: Major characteristic peaks at: 750, 1100, 1200, 1350, 1450, 1650, 1700, 3000 and 3500 cm <sup>-1</sup>

#### **3. PHYSICAL AND CHEMICAL PROPERTIES**

The notified polymer is imported as an 80% solution in butyl acetate and is never isolated. The physico-chemical properties relate to this solution.

<b>Appearance at 20°C and 101.3 kPa:</b>	yellowish liquid
<b>Odour:</b>	characteristic solvent odour
<b>Boiling Point:</b>	approximately 127°C
<b>Density:</b>	1090 kg/m <sup>3</sup>

<b>Vapour Pressure:</b>	1.2 kPa at 20°C
<b>Water Solubility:</b>	insoluble
<b>Flash Point:</b>	34°C (closed cup)
<b>Flammability Limits:</b>	lower 1.2%, upper 7.5% both by volume in air
<b>Autoignition Temperature:</b>	370°C (polymer)
<b>Explosive Properties:</b>	not explosive

#### **Comments on physico-chemical properties**

The water insoluble nature of the polymer is consistent with the notified chemical's polyester structure.

The polymer contains esters on the side chains. However, due to its low solubility in water, these are not expected to hydrolyse under normal environmental conditions.

The partition co-efficient would be difficult to measure but is expected to be high due to its low water solubility.

It is likely that the material will remain strongly associated with soil or sediment compartments as any spills or accidental releases will result in evaporation of the solvent.

There may be a very small amount of residual free carboxylic acid, expected to have typical acidity.

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

<b>Degree of purity:</b>	> 99%
<b>Toxic impurities:</b>	all but one of the residual monomers were at levels of < 0.1%; one of the residual monomers, which is an eye, skin and respiratory irritant is present in the polymer at 0.5%
<b>Non-hazardous impurities (&gt; 1% by weight):</b>	none
<b>Maximum content of residual monomers:</b>	1%
<b>Additives/Adjuvants:</b>	none

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

The notified polymer is intended to be used in industrial coatings. It will be imported as an 80% solution in butyl acetate in 200 L steel drums at a rate of 10 tonne per year for the first five years.

## **6. OCCUPATIONAL EXPOSURE**

The notified polymer will be transported by road to a single site. Exposure is unlikely except in the event of an accident during transport, loading or unloading.

At the single site of reformulation into paint, the polymer solution will be manually transferred from the drums into sealed mixers. This typically involves removal of the drum bung and either gravity feed with the drum in a drum cradle or pumping of the drum contents following insertion of a drum lance. At this particular site it has been estimated that a spill occurs perhaps once per 20 drums processed. Otherwise exposure is limited to drips and splashes. Following the addition of other resins and solvents the completed paint is drummed off into 20 and 200 L drums for transport to customers by road.

Transfer and filling operations will be conducted under local exhaust ventilation. The paint make-up will be conducted for 60 days per year, 2 hours per day. The duration of quality control and drum filling on the same days is expected to be 8 hours per day.

Laboratory testing should involve small scale formulation with limited opportunity for exposure. Other possibilities for limited exposure involve trial spraying, equipment maintenance and correction of system breakdown all of which should occur infrequently.

At the end users' sites, paint is normally applied to automotive parts by spraying in a down draught booth automatically for 8 hours per day, 200 days per year. The formulated paint is either pumped or gravity fed into a circulation tank, isocyanate-containing hardener is added manually, mixing occurs and the paint is sprayed immediately onto the automotive parts. Addition to circulation tanks and clean-up of spray equipment is expected to take 1 hour per day, 200 days per year. There is potential for dermal exposure to the paint during these operations. Inhalational exposure is unlikely due to containment of spray within the spray booths.

## **7. PUBLIC EXPOSURE**

Adequate measures are described by the applicant to ensure the general public are not exposed to the notified polymer solution during the formulation or automotive painting procedures. Minimal exposure is expected as a result of the public making contact with the painted automobile parts, and may occur if the paint on the automobile is accidentally removed due to vehicle damage.

Minor public exposure may result from disposal of unused polymer solution, or paint which incorporates the notified polymer solution. Minor public exposure may also result from accidental spillage of the notified polymer solution during transport and storage, and during formulation.

## **8. ENVIRONMENTAL EXPOSURE**

### **. Release**

With the exception of accidental spillage, there are three separate stages where release to the environment is likely to occur.

Initial laboratory development of the reformulated paint mix (which takes place at a single site) involves manufacture and testing of paint formulations. No indication has

been given of the amount of chemical which will be used in laboratory development, however, it is not likely to be significant, so waste generation will not be great. All chemical used in the laboratory will be sent to waste, and will either be landfilled or incinerated.

Once laboratory work is finalised, the next stage is paint manufacture (reformulation), also carried out at the same site. Phases involve reformulation, quality control testing and filling into 200 L and 20 L drums for transport to end customers. Stages in reformulation include mixing with other chemicals, blending, and filtration. Transfer from mixing/blending to 200 and 20 L containers takes place under local exhaust ventilation. The high molecular weight of the polymer suggests it will not be volatile, and any release through fumes is likely to result from the solvent.

Quality control testing includes trial paint applications, both automatic and manual. Waste resins from the reformulation stage are disposed of via a process which converts waste resin and paint from solution into an inert solid which is then landfilled. Drums containing paint residue will be disposed by recycling via a drum reconditioner where the drum is incinerated and washed for other uses.

Again, no indication of the amount of chemical released is given, but it is unlikely that release of the chemical through trialing, experimentation and reformulation will account for any more than 5% of the total chemical imported.

The paint product is transported to automotive plant customers. At each of the four plants, the reformulated paint finish is filled into paint circulation tanks, mixed with polymeric isocyanate hardeners and channelled to spraying workshops where it is sprayed onto automotive parts with automatic spray equipment. The coated parts are then heat cured. Paint finishes on automotive parts will typically contain the new polymer at around 25%.

Application of the paint finish to automotive parts is by air-atomisation spray. Transfer efficiencies range from 35 - 75%, depending on the application method. Resultant oversprays are trapped by high efficiency water scrubbing systems and the paint finish is removed from the scrubbers using flotation techniques. Although this minimises any release to the environment during application operations, the significant quantities of sludge captured by pollution control technology would be disposed of to landfill.

## **. Fate**

The fate of the polymer is either to be bound to automotive parts within or on vehicles, or disposed of by landfill/incineration. The polymer, incorporated in a paint finish, has been fully cured into a solid coating matrix on the surface of treated automotive parts. This remains with the vehicle. Any fragments or chips of the cured paint that occur will be inert and form part of the sediments.

The notifier has no control over any process once the chemical has been imported, however, any insoluble residues remaining in drums are likely to be treated by a drum recycler and incinerated, or will be landfilled with the containers. Due to the hydrophobic nature of the polymer it will be relatively immobile within the landfill. Incineration will result in oxides of carbon as well as water, and is not considered to provide a threat to the environment.

Excess paints and residues from cleaning of spray equipment, scrubber apparatus, and filters, will be disposed of by landfill where the polymer would be immobilised through incorporation in the dried paint.

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

Toxicological data are not required for polymers of number-average molecular weight (NAMW) > 1000 according to the Act and no data were submitted for the notified polymer.

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

The notifier has not presented any ecotoxicity results for the polymer. This is acceptable as ecotoxicity tests are not required for a polymer with NAMW > 1000 according to the Act.

The polymer is not expected to show ecotoxicity effects as a result of the high molecular weight and expected low water solubility and is therefore of low concern (1) because large polymers of this nature are not readily absorbed by biota.

While it is unlikely to cross biological membranes due to its high molecular weight the notified product does contain approximately 13.36% low molecular weight material (NAMW < 1000 with 6.39% < 500). This includes <1% of unreacted monomers, with the remainder consisting of partly reacted monomers, and low molecular weight, fully reacted polymer. When formulated into paints and heat cured on final products, this low molecular weight material is unlikely to provide a hazard to the environment.

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

The environmental hazard during laboratory testing and reformulation is expected to be low. It is unlikely that release of the chemical through trialing, experimentation and reformulation will account for any more than 5% (< 50 kg) of the total chemical imported. Laboratory testing is carried out on 20 days per year, and paint manufacture (including quality control and testing) on 60 days per year. All the above is carried out at one site. A release of 50 kg per year equates to around 625 g per day.

The reformulated paint finish is applied by air-atomisation spray on to automotive parts. Four sites have been identified as end use customers. Transfer efficiencies range from 35 - 75%, depending on the application method. As a worst case, with only 35% efficiency in spraying, out of the 20 tonnes imported, up to 13 000 kg could be lost each year as a result of overspray. Spraying operations are carried out on 200 days of the year, and this equates to an average of 65 kg each day, or around 16 kg a day per site which will be landfilled and immobilised through incorporation in the dried paint.

As the paint waste trapped in the air filters is expected to dry out and cure before disposal, the hazard from this material is expected to be negligible when it is landfilled or incinerated. Any spray droplets not trapped by the air filter will dry out and polymerise to an inert particle. The waste water from the water trap is expected to be discharged to the sewer, where it will be diluted by several orders of magnitude and/or partition to the sludge and become trapped in the solids at the sewage treatment works. The solids are disposed of by landfill or incineration. Incineration of the polymer will generate oxides of carbon as well as water. The environmental hazard can be rated as negligible. As the polymer is expected to be insoluble in water, the polymer waste consigned to landfill is unlikely to leach and will stay in the landfill. Hydrolysis of the polymer is expected to be extremely slow due to

the low solubility in water. The environmental hazard from the disposal of paint waste containing the polymer is rated as low.

Instructions in the Material Safety Data Sheet (MSDS) are adequate to limit the environmental exposure from spills etc. and therefore the environmental hazard from possible accidental spills should be low if these recommendations are followed.

The overall environmental hazard from the use of the polymer is rated as low.

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

The notified polymer has a NAMW > 1000 and is unlikely to be able to cross biological membranes and cause systemic effects. The levels of low molecular weight species (approximately 14% with NAMW < 1000 and 7% with NAMW < 500) and residual monomers (< 1%) would not be expected to render the notified polymer hazardous according to Worksafe Australia's *Approved Criteria for Classifying Hazardous Substances* (2). Thus it can be predicted that the notified polymer should be of low toxicological concern.

The major opportunity for exposure to the notified polymer will be during paint formulation when the imported polymer solution is added to the mixing vessel. Exposure of the skin to spills, drips or splashes may occur, avoidance of which will require the donning of protective clothing and gloves as described below. Drumming off of the formulated paint is automatic and should not result in exposure.

At the end users' sites dermal exposure to the notified polymer in paint is possible during filling of circulation tanks. However, the major hazard in this case is likely to come from the hardener and solvents in the finished paint rather than from the notified polymer.

The risk of adverse occupational health effects may be considered to be low primarily because of the low hazard of the notified polymer but also due to infrequent exposure to the imported resin solution or to the formulated paint. It should be noted, however, that the imported resin solution contains a flammable solvent, n-butyl acetate, at a concentration likely to render the solution a moderate to severe eye irritant. The formulated paint is likely to be hazardous due to hardener and solvent content but not because of the polymer content which is at 25% in the final product.

The risk of adverse public health effects is considered to be minimal given the low hazard of the polymer and fact that public exposure is considered to be unlikely.

## **13. RECOMMENDATIONS**

To minimise occupational exposure to Polymer in Desmophen TP LS 2971 the following guidelines and precautions should be observed:

- if engineering controls and work practices are insufficient to reduce exposure to a safe level, then the following personal protective equipment which conforms to Australian Standards (AS) or Australian/New Zealand Standards (AS/NZS) should be worn;

safety goggles should be selected and fitted in accordance with AS 1336 (3) to comply with AS/NZS 1337 (4),

industrial clothing should conform to the specifications detailed in AS 2919 (5),

impermeable gloves or mittens should conform to AS 2161 (6),

all occupational footwear should conform to AS/NZS 2210 (7);

- users of the imported resin formulation should note the presence of n-butyl acetate and take appropriate precautions; users of the formulated paint containing the notified polymer should note the presence of hazardous components and should consult the MSDS to determine the nature of the hazards and the protective measures required;
- spillage of the notified chemical should be avoided, spillages should be cleaned up promptly with absorbents which should then be put into containers for disposal in accordance with Local or State government regulations;
- good personal hygiene should be practised to minimise the potential for ingestion;
- a copy of the MSDS should be easily accessible to employees.

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

The MSDS for Desmophen TP LS 2971 containing the notified chemical was provided in accordance with *the Code of Practice for the Preparation of a Material Safety Data Sheets* (8).

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.

#### **15. REQUIREMENTS FOR SECONDARY NOTIFICATION**

Under the Act, secondary notification of Polymer in Desmophen TP LS 2971 shall be required if any of the circumstances stipulated under subsection 64(2) of the Act arise. No other specific conditions are prescribed.

#### **16. REFERENCES**

1. Nabholz J V, Miller P and Zeeman M 'Environmental Risk Assessment of New Chemicals Under the Toxic Substances Control Act TSCA Section Five', in *Environmental Toxicology and Risk Assessment*, W G Landis, J S Hughes and M A Lewis (Eds), pp 40-55.
2. National Occupational Health and Safety Commission 1994, *Approved Criteria for Classifying Hazardous Substances [NOHSC:1008(1994)]*, Australia Government Publishing Service, Canberra, Australia.
3. Standards Australia, 1994, *Australian Standard 1336-1994, Recommended Practices for Eye Protection in the Industrial Environment*, Standards Association of Australia Publ., Sydney, Australia.
4. Standards Australia, Standards New Zealand 1992, *Australian/ New Zealand Standard 1337-1992, Eye Protectors for Industrial Applications*, Standards



Association of Australia Publ., Sydney, Australia, Standards Association of New Zealand Publ. Wellington, New Zealand.

5. Standards Australia, 1987, *Australian Standard 2919 - 1987 Industrial Clothing*, Standards Association of Australia Publ., Sydney, Australia.
6. Standards Australia 1978, *Australian Standard 2161-1978, Industrial Safety Gloves and Mittens (excluding Electrical and Medical Gloves)*, 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. National Occupational Health and Safety Commission 1994, *National Code of Practice for the Preparation of Material Safety Data Sheets [NOHSC:2011(1994)]*, AGPS, Canberra, Australia.