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**NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION  
AND ASSESSMENT SCHEME**

**FULL PUBLIC REPORT**

**Polymer in DUOME**

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Director  
Chemicals Notification and Assessment

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

Du Pont (Australia) Ltd of 49-59 Newton Road WETHERILL PARK NSW 2164 has submitted a limited notification statement in support of their application for an assessment certificate for Polymer in DUOME.

**2. IDENTITY OF THE CHEMICAL**

Polymer in DUOME is not considered to be hazardous based on the nature of the chemical and the data provided. Therefore the chemical name, CAS number, molecular and structural formulae, exact molecular weight, spectral data, details of the polymer composition and details of exact import volume have been exempted from publication in the Full Public Report and the Summary Report.

**Other Names:** Polyester in DUOME

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

**Maximum Percentage of Low  
Molecular Weight Species  
Molecular Weight < 1 000:** high

**Method of Detection  
and Determination:** infrared spectroscopy

**3. PHYSICAL AND CHEMICAL PROPERTIES**

**Appearance at 20°C  
and 101.3 kPa:** glass-like

**Boiling Point:** decomposes before boiling at > 200°C

**Glass Transition Range:** -20°C to 50°C

**Specific Gravity:** estimated as 1.1 - 1.2

**Vapour Pressure:** polymer does not vapourise

<b>Water Solubility:</b>	not given
<b>Partition Co-efficient (n-octanol/water):</b>	not given
<b>Hydrolysis as a Function of pH:</b>	not given
<b>Adsorption/Desorption:</b>	not given
<b>Dissociation Constant:</b>	not given
<b>Flash Point:</b>	not given
<b>Flammability Limits:</b>	not given
<b>Autoignition Temperature:</b>	expected to be greater than 250°C
<b>Explosive Properties:</b>	not known
<b>Reactivity/Stability:</b>	expected not to be highly reactive

### **Comments on Physico-Chemical Properties**

Water solubility has not been determined. However, the notifier claims that by analogy with similar polyester resins the water solubility would be expected to be less than 1 ppm. It is noted that the polymer contains a large amount of low molecular weight species that could in theory lead to an increase in water solubility. However, the intended use of the polymer in a two part isocyanate cured paint system, and the fact that the polymer is never separated from the paint system in Australia, suggests that the polymer should not be exposed to the aquatic compartment.

The polymer contains several ester functionalities that are susceptible to hydrolysis. However, hydrolysis in the environmental pH range is not expected due to the expected low water solubility.

Due to the expected low water solubility, it is expected that the polymer will have a low partition coefficient. The majority of the polymer is not expected to cross biological membranes due to its high molecular weight, expected low water solubility and partition coefficient (2, 3, 4).

On the basis of the expected low water solubility and low partition coefficient, the polymer is likely to adsorb to, or be associated with, soil/sediment and organic matter, and thus be immobile in soils. The polymer contains no acidic or basic functionalities that will dissociate in water.

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

**Degree of Purity:** > 99.1%

**Toxic or Hazardous Impurities:** < 0.8%

**Non-hazardous Impurities (> 1% by weight):** none

**Maximum Content of Residual Monomers:** 0.8%

**Additives/Adjuvants:** 0.1%

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

The notified chemical will be used as a component of a paint formulation for use in the automotive refinish industry. The formulation contains less than 25% of the notified polymer (see attached Material Safety Data Sheet - MSDS) together with a minimum of 30% of various solvents including butyl acetate, aromatic hydrocarbons, xylene and ethyl 3-ethoxy propionate. The amount of polymer to be imported is less than 10 tonnes per year in the first five years.

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

The paint containing the notified polymer will be imported in 4 L steel friction fit cans. The formulation containing the notified polymer constitutes one part of a two part paint system with the other part being an isocyanate hardener. Each part is decanted directly from the cans into a mixing beaker that acts to measure the two parts and thence to mix them together. Dermal exposure to the notified polymer is possible during these operations.

The mixed paint is immediately sprayed onto the vehicle prior to full polymerisation. As the paint will be sold for use by professional spray shops, it is expected that appropriate spray booths will be employed to minimise exposure to spray. Where spray booths are not employed, inhalational exposure to spray is likely.

#### **7. PUBLIC EXPOSURE**

There is negligible potential for public exposure to the notified polymer arising from its use in the spray painting industry. Paints containing the polymer will not be sold to the public. There may be widespread contact with cars painted with the formulations containing the polymer, but its incorporation into the paint film and its physico-chemical properties will be sufficient to preclude absorption across the skin or other biological membranes.

## **8. ENVIRONMENTAL EXPOSURE**

### **Release**

As mentioned above, two parts are mixed prior to application of the paint. The parts are poured directly from the manufacturer's cans into the mixing beaker. The mixing is carried out in a single designated mixing beaker that also acts to measure the parts, thus eliminating residue in multiple containers. The mixed paint is then poured into the spray equipment for application. Immediately on mixing the two parts begin crosslinking.

During application, up to 20 to 50% of the polymer may be lost through overspray. However, release of the paint will be contained within spray booths. Overspray will be captured and collected through the spray booths' filtering system. Solid residues are trapped in the filter, which when due for replacement is disposed of to landfill.

In approximately 30% of spray shops, a 'wet floor' arrangement is used in place of, or in combination, with dry filters. In this instance a water trap is used to catch overspray. The water trap is periodically emptied by a waste disposal company for treatment.

Paint which is unused after mixing and wastes generated through the cleaning of mixing gear and application equipment is estimated at 10 to 20%. All liquid waste paint will be disposed of to a waste drum. The material is typically sent to a waste disposal company for solvent recovery. This solidified residue obtained as a result of this process will be disposed of to landfill.

Residues of mixed paint containing the notified polymer remaining in paint cans is estimated by the notifier at 3%. These residues will dry within the can and be disposed of to landfill. Empty containers, containing uncatalysed paint residues, will be sent to landfill. The notifier estimates that uncured residues will be minimal (estimated to be 5%).

### **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 crosslinked polymer will share the fate of the automotive panels 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. 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.

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

Toxicological data are not required for polymers with a NAMW greater than 1 000 according to the Act and no data were submitted for the notified polymer.

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

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

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

The main environmental exposure to the polymer arises from the landfill disposal of recovered dry waste paint from the mixing and application processes. It is estimated that up to 80% of the polymer may be consigned to landfill due to 50% overspray in application, 20% wastage (including cleaning washings) and 8% residue remaining in containers. However, most of this material will be fully cured and remain immobile in the environment. Uncured residues are also expected to remain immobile in the landfill. 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. The paint product will be imported in small cans that should limit the size of spills. Adequate control procedures are outlined in the MSDS. Any remaining material left after clean-up will quickly become immobile on association with soil/sediment. The polymer is unlikely to present a hazard to the environment when it is incorporated into paint and applied to the panels of cars. Such painted panels will be consigned to landfill or recycled at the end of their useful life. Products of incineration will not pose a hazard to the environment.

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

The notified polymer has a NAMW greater than 1 000 and should not be able to be absorbed across biological membranes to cause systemic effects. The levels of residual monomers (maximum of 0.8%) would not render the polymer hazardous according to the Worksafe Australia's *Approved Criteria for Classifying Hazardous Substances* (Approved Criteria) (5). However, there is a significant level of low molecular weight species with a NAMW of less than 1 000. In general, the toxic properties of the oligomers may be predicted to from those of the monomers of which they are composed. One of the monomers has mutagenic data and is a skin sensitiser and these appear to be the most serious known toxic properties of any of the monomers. However, it is presumed the effects are due to the presence of a reactive epoxy group. Since the epoxy group reacts during polymerisation, it can be predicted that the proportion of free epoxy groups in the oligomers would be low. Thus, the chance of the notified polymer exhibiting mutagenicity or skin sensitisation properties as a result of the oligomer content is likely to be low. Since the paint to be imported contains the notified polymer at less than 25%, any unknown toxic effects of the oligomers and the residual monomers will be correspondingly reduced.

The paint to be imported is mixed with an isocyanate hardener and immediately sprayed onto the vehicles to be refinished. Dermal exposure to the paint is possible, but infrequent, during decanting of the paint and during cleaning of

equipment. Spraying is expected to be carried out in ventilated spray booths so that inhalational exposure to spray is expected to be low. If spray booths are not used inhalational exposure could be significant.

The risk of adverse occupational and public health effects arising from transport, storage, use or disposal of the notified polymer is considered to be negligible. However, the paint to be imported contains a number of solvents which render it hazardous (see attached MSDS). It is expected that the solvents in the paint may be skin, eye, and respiratory irritants and may cause systemic effects on acute or chronic inhalational exposure. Decanting of the paint is likely to be of short duration and the amount of paint decanted at any one time is relatively small. Nevertheless, good general ventilation is necessary and personal protective equipment as outlined below should be worn if conditions are such that the Worksafe exposure standards (6) (see MSDS) for the solvents are likely to be exceeded.

Regarding the isocyanate hardener, Worksafe exposure standards for isocyanates are 0.02 mg/m<sup>3</sup> TWA and 0.07 mg/m<sup>3</sup> STEL (6) due to their sensitisation potential. It is expected that respiratory protection would be worn during decanting the hardener and that such protection will serve to limit exposure to paint solvents.

### **13. RECOMMENDATIONS**

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

- Spillage of the paints containing the notified chemical should be avoided, spillages should be cleaned up promptly with absorbents which should then be put into containers for disposal;
- Good personal hygiene should be practised to minimise the potential for ingestion;
- A copy of the relevant MSDS should be easily accessible to employees.

To minimise exposure to the paint solvents butyl acetate, acetic acid, ethyl 3-ethoxy propionate, xylene and aromatic hydrocarbons the following guidelines and precautions should be observed:

- Spraying of the finish containing the notified chemical onto automobiles should be conducted in ventilated spray booths;
- Good general ventilation (and local exhaust ventilation if necessary) should be employed during decanting paint;
- Worksafe exposure standards (6) for butyl acetate, xylene and acetic acid should be adhered to;

If engineering controls or work practices are insufficient to reduce exposure to paint solvents or isocyanate to a safe level, then personal protective devices which

conform to and are selected, maintained and used in accordance with Australian (or Australian/New Zealand) Standards (AS or AS/NZS) for respiratory protection (7, 8), eye protection (AS 1336, AS/NZS 1337) (9, 10), impermeable gloves (AS 2161) (11), protective clothing (AS 2919) (12) and footwear (AS 2210) (13) should be worn;

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

The MSDS for the paint to be imported, containing the notified chemical, was provided in accordance with the *National Code of Practice for the Preparation of Material Safety Data Sheets* (14).

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, 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.

#### **16. REFERENCES**

1. MDL Information Systems 1996, *MSDS-OHS Database*, MDL Information Systems Inc, CA, USA.
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. Anliker, R., Moser, P. & Poppinger, D. 1988, 'Bioaccumulation of dyestuffs and organic pigments in fish. Relationships to hydrophobicity and steric factors', *Chemosphere*, vol. 17, no. 8, pp. 1631-1644.
4. Connell, D.W. 1989, 'General characteristics of organic compounds which exhibit bioaccumulation', in *Bioaccumulation of Xenobiotic Compounds*, CRC Press, Boca Raton.
5. National Occupational Health and Safety Commission 1994, *Approved Criteria for Classifying Hazardous Substances [NOHSC:1008(1994)]*, Australian Government Publishing Service, Canberra.
6. 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.

7. Standards Australia/Standards New Zealand 1994, *Australian/New Zealand Standard 1715-1994, Selection, Use and Maintenance of Respiratory Protective Devices*, Standards Association of Australia/Standards Association of New Zealand, Sydney/Wellington.
8. Standards Australia/Standards New Zealand 1994, *Australian/New Zealand Standard 1716-1994, Respiratory Protective Devices*, Standards Association of Australia/Standards Association of New Zealand, Sydney/Wellington.
9. Standards Australia 1994, *Australian Standard 1336-1994, Eye protection in the Industrial Environment*, Standards Association of Australia, Sydney.
10. 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, Sydney/Wellington.
11. Standards Australia 1978, *Australian Standard 2161-1978, Industrial Safety Gloves and Mittens (excluding electrical and medical gloves)*, Standards Association of Australia, Sydney.
12. Standards Australia 1987, *Australian Standard 2919-1987, Industrial Clothing*, Standards Association of Australia, Sydney.
13. Standards Australia/Standards New Zealand 1994, *Australian/New Zealand Standard 2210-1994, Occupational Protective Footwear*, Standards Association of Australia/Standards Association of New Zealand, Sydney/Wellington.
14. 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.