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September 1998

**NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION
AND ASSESSMENT SCHEME**

FULL PUBLIC REPORT

Polymer in AL 1K Binder

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Telephone: (61) (02) 9577 9514
Facsimile: (61) (02) 9577 9465

Director
Chemicals Notification and Assessment

FULL PUBLIC REPORT**Polymer in AL 1K Binder****1. APPLICANT**

DuPont (Australia) Ltd of 49-59 Newton Road WETHERILL PARK NSW 2164 has submitted a notification statement accompanying their application for an assessment certificate for the synthetic polymer of low concern Polymer in AL 1K Binder.

2. IDENTITY OF THE CHEMICAL

The following requests for exempt information were accepted: chemical name, CAS No., molecular and structural formulae, constituents, exact molecular weight, concentration of low molecular weight species, spectral data and exact import volume.

Other Names: Polymer in AL 1K Binder

**Number-Average
Molecular Weight (NAMW):** > 10 000

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

**Maximum Percentage of Low
Molecular Weight Species**

Molecular Weight < 500: < 2%

Molecular Weight < 1 000: < 5%

3. PHYSICAL AND CHEMICAL PROPERTIES**Appearance at 20°C
and 101.3 kPa:**

viscous, clear liquid (polymer solution containing up to 60% polymer, 40% xylene is opaque)

Melting Point: not determined

Density: 960-1 000 kg/m³
940 kg/m³ (40-60% polymer solution)

Water Solubility: not determined (see comments below)

Reactivity/Stability:

see comments below

Comments on Physico-Chemical Properties

Water solubility has not been determined. However, the notifier claims that the polymer will have low water solubility by analogy with similar polyamide polymers. Additionally, the application of the polymer as a part of the intermediate coating of an automotive finish requires low water solubility. The polymer contains no polar functionalities which would confer solubility in water, and this together with the high hydrocarbon content indicates very low water solubility.

The aziridine reacts with the pendant carboxylic groups to form α hydroxy amides that are theoretically hydrolysable, but this should not occur in the environmental pH range due to low solubility.

The polymer is stable under normal conditions of use. It will not undergo thermal or photodegradation or depolymerisation.

4. PURITY OF THE CHEMICAL

Residual Monomers/Other Reactants: 0.62%

5. USE, VOLUME AND FORMULATION

The notified polymer will not be manufactured in Australia. It will be imported as a less than 20% wt component of a solvent-based binder for the automotive refinishing industry. Import volumes for the notified polymer are expected to be less than 10 tonnes per annum.

The polymer will be a component of a paint formulation (containing and number of solvents, the main one being xylene at a concentration of up to 60%) that is to be sold as part of a paint system for use by professional spray painters of automotive vehicles. The paint will be imported in 3.79 litre (1 US gallon) cans for direct sale to distributor outlets.

The principal use will be in the automotive refinishing industry as a topcoat. There are approximately 4 000 professional spray shops in Australia. The notifier estimates a maximum of less than 20% penetration of the automotive refinishing market in the short term.

The paint typically will be used in spray booths with exhaust extraction using standard spraying equipment. The paint will be tinted with tinting and mixing (on a paint shaker) occurring after addition of components by gravity flow, plunger pump or manual measuring. Quantities used for each application will vary between 150 mL and 2 L.

6. OCCUPATIONAL EXPOSURE

During transport and handling of cans, exposure is possible if accidental rupture occurs.

During manual pouring, tinting and mixing of the final paint, dermal and ocular exposure to the notified polymer is possible. Following use of spraying equipment, solvent cleaning is required, in which case dermal and ocular exposure to polymer residues in the spraying equipment and in paint containers is possible. Exposure may also be possible during equipment maintenance.

Where spray booths with exhaust extraction are employed exposure to aerosols is expected to be limited. However, where spray booths are not used, dermal, ocular and respiratory exposure is possible.

7. PUBLIC EXPOSURE

The potential for public exposure to the notified polymer is negligible since it would be used only in industrial applications. As a component of a refinish undercoat used to protect the metal shells of automobiles, the notified polymer is expected to be immobilised and not bioavailable.

8. ENVIRONMENTAL EXPOSURE

Release

Waste paint containing the notified polymer may be generated in the following ways. Unused/leftover paint mixed with thinners, hardener, etc, and retained in spray equipment after use, will be disposed of to a waste drum. This material (totaling up to 10% of paint) is typically sent to a waste disposal company for solvent recovery. The solidified residue obtained is taken to State Waste Management Centres for consignment to landfill.

Overspray is caught in filters of the spray booth and may constitute from 20-50% of total paint sprayed. Solid residues are trapped in the filter, which is typically replaced every three months and disposed of to landfill or incinerated.

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. Periodically (this may typically be every three months), water from the trap is collected by a waste disposal company for treatment. This treatment usually involves flocculation or centrifugation of the suspended material, which is then taken to State Waste Management Centres and either, consigned to landfill or incinerated.

The painted vehicles are baked to cure the polymer into a paint film. The crosslinked polymer will be effectively inert and will be disposed of with the vehicles. Releases of the cured polymer during vehicle repairs, etc. will be diffuse and limited to small quantities of the cured polymer.

Fate

The low water solubility of the notified polymer indicates leaching from landfill sites is not expected. Any incineration of the notified polymer is expected to produce water and oxides of carbon and nitrogen.

The majority of the notified polymer is not expected to be released to the environment until it has been cured into a solid polymer matrix. The resultant matrix structure should limit the hydrolysis or biodegradation of the polymer. Bioaccumulation of the polymer is unlikely due to the high molecular weight of the polymer even before curing (Connell, 1989).

9. EVALUATION OF TOXICOLOGICAL DATA

No toxicological data provided.

10. ASSESSMENT OF ENVIRONMENTAL EFFECTS

No ecotoxicological data provided.

11. ASSESSMENT OF ENVIRONMENTAL HAZARD

Disposal of the notified polymer to landfill (up to 60% of imported polymer as either an inert solid or cured paint largely from paint overspray) is unlikely to present a hazard to the environment, as it will be in a solid matrix and is not expected to biodegrade or leach.

The main environmental hazard would arise through spillage in transport accidents that may release small quantities of the uncured polymer to drains and waterways. However, the polymer would quickly become immobile on association with soil/sediment layer.

The low environmental exposure of the polymer as a result of the proposed use, together with its expected low environmental toxicity, indicates the overall environmental hazard should be low.

12. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY EFFECTS

Polymer in AL 1K Binder has been notified as a synthetic polymer of low concern under section 23 for the purposes of section 24A of the Act. The polymer meets the criteria for a synthetic polymer of low concern specified in regulation 4A of the Act and can, therefore, be considered to be of low hazard to human health.

The occupational health risk posed to transport and storage workers is negligible, given the expected negligible exposure to the notified chemical under normal circumstances, and the anticipated low health hazard.

As the notified polymer is contained in a paint which may adhere to the unprotected skin or eye, there is potential for workers to experience prolonged dermal or ocular exposure as a

result of contamination during mixing and spraying. However, the occupational health risk is likely to be negligible given the likely low health hazard and the fact that the polymer is at a level of less than 20% in the paint. As spraying will typically be conducted in a ventilated spray booth, inhalation exposure is expected to be low and the occupational health risk from this source is considered to be negligible. Where spraying is not conducted in a ventilated spray booth, the occupational health risk due to the notified polymer is still considered to be negligible because of its low health hazard.

According to the Material Safety Data Sheet (MSDS), the paint to be imported contains a number of solvents which have NOHSC exposure standards (National Occupational Health and Safety Commission, 1995). The major hazard, however, appears to be xylene, present at up to 60%, which has an exposure standard of 80 ppm (TWA) or 150 ppm (STEL) and a concentration cutoff of 12.5% for health effects (National Occupational Health and Safety Commission, 1994a, 1995). On this basis the paint is harmful by inhalation and skin contact and irritant and would require the risk phrases R10, R20/21 and R38. The other solvents are present at less than 5% and have the following NOHSC exposure standards: amyl acetate, 125 ppm, butyl acetate, 150 ppm (TWA) or 200 ppm (STEL), toluene, 100 ppm (TWA) or 150 ppm (STEL). Toluene is listed on the NOHSC *List of Designated Hazardous Substances* with a concentration cutoff of 12.5% for health effects and would require risk phrases R11 and R20 (National Occupational Health and Safety Commission, 1994a). Employers are responsible for ensuring that the NOHSC exposure standards are not exceeded. Where engineering controls or work practices are inadequate to reduce exposure below the above levels, skin, eye and respiratory protective equipment selected and used in conformity with Australian or Australian/New Zealand Standards should be worn.

The risk to the public from transport, storage, use or disposal of the notified polymer is expected to be negligible.

13. RECOMMENDATIONS

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

- Spillage of the notified chemical should be avoided. Spillage should be cleaned up promptly with absorbents and 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;
- A ventilated spray booth should be employed during spraying of paint containing the notified polymer.

To minimise occupational exposure to solvents contained in the paint to be imported containing the notified polymer, the following guidelines and precautions should be observed:

- A ventilated spray booth should be employed during mixing and spraying of paint containing the notified polymer and during solvent cleaning of equipment;
- NOHSC exposure standards for solvents contained in the imported paint should be observed; these are: amyl acetate, 125 ppm; butyl acetate, 150 ppm (TWA) or 200 ppm (STEL); toluene, 100 ppm (TWA) or 150 ppm (STEL) (National Occupational Health and Safety Commission, 1995);
- Where exposure standards for solvents may be exceeded or where exposure to aerosols arising from spraying may occur, a respirator conforming to Australian/New Zealand (AS/NZS) Standards 1715 and 1716 (Standards Australia, Standards New Zealand, 1994a, 1994b) should be worn;
- Impermeable gloves or mittens conforming to AS/NZS 2161.2 (Standards Australia, Standards New Zealand, 1998) should be worn;
- Industrial clothing conforming to the specifications detailed in Australian Standard 2919 (Standards Australia, 1987) should be worn;
- All occupational footwear should conform to AS/NZS 2210 (Standards Australia, Standards New Zealand, 1994c)

14. MATERIAL SAFETY DATA SHEET

The MSDS for the paint to be imported containing the notified polymer was prepared in accordance with the *National Code of Practice for the Preparation of Material Safety Data Sheets* (National Occupational Health and Safety Commission, 1994b).

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

Connell DW (1989) General characteristics of organic compounds which exhibit bioaccumulation. In: D. W. Connell ed. *Bioaccumulation of Xenobiotic Compounds*. CRC Press, Boca Raton.

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

National Occupational Health and Safety Commission (1994b) 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: ed. Exposure Standards for Atmospheric Contaminants in the Occupational Environment: Guidance Note and National Exposure Standards. Australian Government Publishing Service, Canberra.

Standards Australia (1987) Australian Standard 2919-1987, Industrial Clothing. Standards Association of Australia, Sydney.

Standards Australia/Standards New Zealand (1994a) 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.

Standards Australia/Standards New Zealand (1994b) Australian/New Zealand Standard 1716-1994, Respiratory Protective Devices. Standards Association of Australia/Standards Association of New Zealand, Sydney/Wellington.

Standards Australia/Standards New Zealand (1994c) Australian/New Zealand Standard 2210-1994, Occupational Protective Footwear. 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, Sydney/Wellington.