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NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME

FULL PUBLIC REPORT

Polymer in BAYDERM Finish 65 UD

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Director
Chemicals Notification and Assessment

FULL PUBLIC REPORT

Polymer in BAYDERM Finish 65 UD

1. APPLICANT

Bayer Australia Ltd of 633-647 Springvale Road MULGRAVE NORTH VIC 3170 has submitted a limited notification statement in support of their application for an assessment certificate for Polymer in BAYDERM FINISH 65 UD.

2. IDENTITY OF THE POLYMER

The notified polymer is a very complex copolymer of relatively high molecular weight containing a large number of different functionalities. The major structural feature of the polymer is that of a polyurethane. The polymer is imported and supplied as a dispersion in water and is contained in the product known as BAYDERM FINISH 65 UD.

3. PHYSICAL AND CHEMICAL PROPERTIES

The notified polymer is imported as an aqueous dispersion. The following properties correspond to this dispersion unless specified otherwise.

Appearance at 20°C and 101.3 kPa:	white liquid with slight odour
Boiling Point:	>100°C (water)
Density:	1050 $kg.m^{-3}$
Vapour Pressure:	approximately 2.34 kPa (water)
Water Solubility:	not determined - see comments below
Hydrolysis:	no data provided - see comments below
Partition Co-efficient (n-octanol/water):	not determined - see comments below

Adsorption/Desorption:	not determined - see comments below
Dissociation Constant:	not determined - see comments below
Flash Point:	> 100°C
Flammability Limits:	not flammable
Autoignition Temperature:	not determined
Explosive Properties:	not explosive
Reactivity/Stability:	stable under normal conditions of use

Comments on Physico-Chemical Properties

No water solubility data was supplied with the notification, however, the lack of polar residues in the polymer indicates low true water solubility. Furthermore, the material is supplied as a dispersion (or emulsion) in water, and this is probably stabilised by surfactants or other adjuvants.

The polymer contains urethane and urea groups which are susceptible to hydrolysis under extreme pH conditions, but are expected to be stable in the environmental range of pH 4 to pH 9. The anticipated low true water solubility (see above) would also lower the potential for hydrolysis by preventing intimate contact between the susceptible groups and the aqueous environment.

The partition coefficient was not determined, and the notifier indicated that the polymer is expected to be surface active, and that this precludes easy measurement of this parameter. However, it is likely that any surface activity of the new polymer (note - no surface tension data were provided) is a consequence of non-specified adjuvants added to enable dispersion of the polymer in water. Nevertheless, the polymer contains many aliphatic and aromatic hydrocarbon groups, and with relatively few polar groups, it would be expected to partition into the oil phase. Similar reasoning indicates that the polymer would associate with natural organic matter, and consequently could be expected to bind to the organic component of soils and sediments.

No dissociation data were provided, but the polymer contains difunctional amines, and it is not certain that all these functionalities would be converted to urethane and urea linkages during the polymerisation. If present, terminal amine groups would impart slightly basic properties on the polymer dispersion. This is supported by the pH for the dispersion which is given as pH 7.5 to 10.0 in the Material Safety Data Sheet (MSDS) supplied with the notification.

4. USE, VOLUME AND FORMULATION

The notified polymer will not be manufactured in Australia, but will be imported as a 30 to 60% aqueous dispersion in 120 kg plastic hobbocks.

It is anticipated that approximately 60 tonnes of BAYDERM FINISH 65 UD (containing less than 20 tonnes of the notified polymer) will be imported annually over the next five years.

BAYDERM FINISH 65 UD is mixed with other chemicals such as binders, flow modulators, solvents and pigments to form the “finishing mix” which will contain less than 10% of the notified polymer.

5. OCCUPATIONAL EXPOSURE

The notified polymer is used as a component of a finish for high quality leather upholstery in luxury vehicles. The product containing the notified polymer is imported in plastic hobbocks. The hobbocks are transported by road to the notifier’s warehouse and then dispatched to the customer’s site and stored until required for production. The storage facilities for the containers are not bunded, but the factory floor is designed with a drainage system to collect spillages. During this phase of operations, worker exposure (approximately 42 personnel) is only likely in the event of an accidental spill.

At the leather treatment site, 12 to 14 workers will be involved in the treatment process, which will occur 8 hours per day, 200 days per year. This involves preparation of the finishing mix which is produced by pumping the required amount of BAYDERM FINISH 65 UD (metered dose) directly from the 120 kg hobbocks to a sealed blending tank. Worker exposure is expected to be negligible during these processes, however, there may be some potential for worker exposure during disconnection of feed lines. The finishing mix is added to a rolling machine manually via a hose in a batchwise manner using gravity feed. Provided that splashing is minimal, worker exposure to the notified chemical should be negligible. Finally, the finishing mix is applied to leather using a sealed, slow-speed rolling machine. The polymer cross-links to the surface of the leather shortly after application.

The blending and application of the substance is carried out under local and general ventilation, hence inhalatory exposure is expected to be negligible.

6. PUBLIC EXPOSURE

The public will only be exposed to the polymer when coming into contact with the surface of the leather upholstery treated with BAYDERM FINISH 65 UD. In general, a layer of clothing will prevent dermal contact, and since the polymer is chemically bonded to the surface of the leather, exposure will neither be widespread nor of a significant magnitude.

In the event of a transport accident, spilt material is absorbed onto vermiculite, sand or earth and is expecetd to be disposed of in accordance with State and Local government regulations.

7. ENVIRONMENTAL EXPOSURE

Release

The finishing mix contains less than 10% of the new polymer and is applied to the leather in a sealed slow speed “rolling machine”. The finishing mix is delivered from the blending tank to the rolling machine in a batchwise manner manually using a hose, and it was indicated that leather finishing would be performed in this manner for 8 hours a day for 200 days a year. No further details of the equipment used or waste control and trapping measures was indicated in the notification. However, the notifier indicated that, based on past experience, around 1.5% of the polymer would be lost through spills and disposal of residuals resulting from the blending and application processes. This amounts to an annual release of around 270 kg for the new polymer.

Polymer released during leather treatment (that is, as a consequence of spills and discarded residuals from blending and application) will be discharged to the combined plant effluent which is treated prior to final discharge to a sewer system. The notifier gave no indication of the expected degree of fixation of the new polymer to the leather, but any of the polymer which does not become bound to the leather would also be discharged to, and treated with, the combined plant effluent. In supplementary information supplied by the notifier, the waste treatment process at the customer facility was described as including dissolved air flotation (with the use of flocculants), belt filtration for dewatering of sludge, and final pH adjustment of the aqueous effluent prior to final discharge. The notifier indicated that due to the hydrophobic nature of the polymer (low water solubility) it is expected that greater than 90% of the waste polymer would become associated with the solid sludge. This sludge is removed by a licensed waste contractor and placed into landfill. Any residual polymer not assimilated into the solid sludge will be released with the aqueous effluent, but again it is expected that due to the essentially hydrophobic nature of the polymer, it would rapidly become associated with the hydrophobic nature of the polymer (low water solubility) it is expected that greater than 90% of the waste polymer would become associated with the solid sludge. This sludge is removed by a licensed waste contractor and placed into landfill. Any residual polymer not assimilated into the solid sludge will be released with the aqueous effluent, but again it is expected that due to the essentially hydrophobic

nature of the polymer, it would rapidly become associated with organic material and become assimilated into sewer sediments and/or sewage treatment plant sludge. When applied to leather the polymer becomes incorporated into a highly cross-linked matrix which could be expected to be very stable, and little release of the polymer as a consequence of abrasion or leaching is expected. Residual material in the hobbocks is washed out with make up solvent and used in blending subsequent batches of the finishing mix. The empty hobbocks are then disposed of to landfill by a waste contractor.

Fate

The polymer is not expected to be mobile in a landfill situation, and the high content of hydrophobic residues indicates that it would become strongly associated with the organic component of soils. No information on biodegradation was provided with the notification, but it is expected that when placed into landfills in association with sediments and sludges, that the polymer would be slowly degraded through the action of abiotic and bacteriological processes operative in these facilities. In an aerobic environment the polymer would degrade to water and oxides of carbon and nitrogen, while under anaerobic conditions methane, ammonia and nitrogen may also be produced. Incineration of sludges containing the polymer would result in its destruction, again with production of water and oxides of carbon and nitrogen.
It is probable that at the end of their serviceable lives the old car seats would be disposed of to landfill, or possibly be incinerated, where the fate of the polymer would be as described above.

8. EVALUATION OF TOXICOLOGICAL DATA

No toxicology data were provided, which is acceptable for polymers of number-average molecular weight (NAMW) >1000 according to the Act.

9. ASSESSMENT OF ENVIRONMENTAL EFFECTS

No ecotoxicology data were provided, which is acceptable for polymers of number-average molecular weight (NAMW) > 1000 according to the Act.

10. ASSESSMENT OF ENVIRONMENTAL HAZARD

The environmental hazard from the notified polymer is considered to be low when used as a finish for leather as indicated. It is estimated that 1.5% of the new polymer (ie around 270 kg per annum) may be lost as waste from the preparation of treatment solutions, and further quantities of polymer (amount not specified) may be lost as a consequence of incomplete fixation of the polymer to leather. Due to the low water solubility of the new polymer, most of this residual is expected to become assimilated into the waste sludge from the water treatment facility at the applicator's factory. This would then be incinerated or placed into landfill. Any polymer released to sewer as a consequence of inefficient operation of the waste

treatment facility is likely to become associated with organic particulate matter, and would then become assimilated into sewage treatment plant sludge or into sewer sediments.

The polymer is unlikely to be mobile in a landfill and would remain associated with the organic component of soils. Under these conditions it would be slowly degraded to gases such as carbon dioxide, nitrogen, nitrogen oxides and possibly methane and ammonia through the agency of abiotic and bacteriological processes. Incineration would destroy the polymer with production of water vapour and oxides of carbon and nitrogen.

Old leather upholstery would also be disposed of into landfills or incinerators where the fate of the notified polymer would be as described above.

11. ASSESSMENT OF PUBLIC, AND OCCUPATIONAL HEALTH AND SAFETY

With a NAMW greater than 1 000, the notified polymer is unlikely to cross biological membranes and cause systemic toxicity. The proportion of low molecular weight species in the notified polymer is quite low (less than 1%) and is unlikely to be of toxicological significance. Hence, the notified polymer would be considered as not hazardous according to the National Occupational Health and Safety Commission's Approved Criteria for Classifying Hazardous Substances {National Occupational Health and Safety Commission, 1994 #9}

Although no toxicological data were submitted, the manufacturers MSDS for BAYDERM Finish 65UD indicates that the notified polymer in aqueous solution may cause transient eye irritation, and dermatitis following repeated or prolonged exposure. This skin and eye irritancy potential may be due to the basicity of the dispersion, presumably a consequence of the terminal amine groups of the polymer. Since the leather finishing process is mostly contained in sealed systems, workers are unlikely to experience significant eye or skin exposure.

Hence, the risk of adverse effects on the health of workers due to these types of exposures is expected to be minimal. In addition, local exhaust ventilation is employed in the blending and application processes where aerosols may be generated. Therefore, the risk of adverse respiratory effects on workers by inhalation of aerosols is not expected to be significant. Although, dermal and/or eye exposure to the notified polymer may occur during disconnection of the pump line, the frequency of this type of exposure is unlikely to present a high risk to worker health.

When used as intended as a finish for leather upholstery the polymer will cross-link with other polymer chains and also bond to the leather substrate. Consequently, loss of residual monomers or low molecular weight oligomers is expected to be negligible since these species would be effectively "trapped" within the polymer matrix. Hence public exposure is likely to be neither widespread nor of significant magnitude. The notified chemical is neither flammable nor volatile so a spill is unlikely to pose a significant risk to the public.

12. RECOMMENDATIONS

To minimise occupational exposure to the notified polymer in BAYDERM FINISH 65 UD the following guidelines and precautions should be observed:

- Safety goggles should be selected and fitted in accordance with Australian Standard (AS) 1336 {Standards Australia, 1994 #21} to comply with Australian/New Zealand Standard (AS/NZS) 1337 {Standards Australia/Standards New Zealand, 1992 #23};
- Industrial clothing should conform to the specifications detailed in AS 2919 {Standards Australia, 1987 #18};
- Impermeable gloves or mittens should conform to AS 2161 {Standards Australia, 1978 #17};
- All occupational footwear should conform to AS/NZS 2210 {Standards Australia/Standards New Zealand, 1994 #24};
- Spillage of the product 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; and
- A copy of the MSDS should be easily accessible to employees.

13. MATERIAL SAFETY DATA SHEET

The MSDS for the notified polymer in BAYDERM FINISH 65 UD was provided in accordance with the *National Code of Practice for the Preparation of Material Safety Data Sheets* {National Occupational Health and Safety Commission, 1994 #13}.

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

1. Pretsch, C.S.S. 1983, *Tables of Spectral Data for Structure Determination of Organic Compounds*, Springer-Verlag, Berlin.

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

3. Standards Australia 1994, *Australian Standard 1336-1994, Eye protection in the Industrial Environment*, Standards Association of Australia, Sydney.

4. 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.

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

6. Standards Australia 1978, *Australian Standard 2161-1978, Industrial Safety Gloves and Mittens (excluding electrical and medical gloves)*, Standards Association of Australia, Sydney.

7. 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.

8. 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.