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NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME

FULL PUBLIC REPORT

Polymer in NPR-9368

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Under subsection 34(2) of the Act the Director of Chemicals Notification and Assessment is to publish this Report in the Chemical Gazette on November 5 1996.

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Director
Chemicals Notification and Assessment

FULL PUBLIC REPORT**Polymer in NPR-9368****1. APPLICANT**

DuPont Australia Ltd of 49-59 Newton Road WETHERILL PARK NSW 2164 has submitted a notification statement accompanying their application for assessment of a synthetic polymer of low concern, Polymer in NPR-9368.

2. IDENTITY OF THE POLYMER

Based on the nature of the chemical and the data provided, Polymer in NPR-9368, is not considered to be hazardous. Therefore, the chemical identity, specific use, exact import volumes, certain physico-chemical information have been exempted from publication in the Full Public Report.

Trade Names: NPR-9368, NPR-9418 (adhesive formulations are 50% notified polymer / 50% water)

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

Maximum Percentage of Low Molecular Weight Species (polymers and oligomers)
 .(molecular weight < 1 000): < 1%
 .(molecular weight < 500): < 1%

Means of Identification: infrared (IR), solid form can be separated by HPLC or GPC after dissolving in toluene; NAMW and weight % of polymer species were measured using size exclusion chromatography

3. PHYSICAL AND CHEMICAL PROPERTIES

Appearance at 20°C and 101.3 kPa: in solid form, an off white to tan rubbery solid; as latex the polymer produces a milky off white emulsion with a distinctive odour

Water Solubility: polymer manufactured as an emulsion, and is dispersible in water in that form once the emulsion has coalesced the polymer is deposited as a solid with a water solubility of < 1g/L at 20°C

Flammability Limits: not available

Autoignition Temperature: > 260°C

Explosive Properties: dry particles may build up electrostatic charge, the size of the particles is large reducing likelihood of dust explosion, emulsion form is unlikely to have explosive properties

Particle Size Distribution: as an emulsion, the polymer can form a film of unlimited size

Comments on physico-chemical properties

The company claims that the polymer is manufactured and sold in an emulsion form and is dispersable in water in that form. However, once the emulsion has coalesced the polymer is deposited as a solid polymer mass that has solubility in water << 1 ppm.

The polymer contains no reactive groups or functionalities likely to become charged in the environmental pH range.

The data provided are acceptable for a polymer of low concern.

4. PURITY OF THE CHEMICAL

Table 2: Maximum weight-percentage of residual monomers and impurities

Impurity	Synonyms	CAS No.	% Weight
2 chlorobutadiene	chloroprene β-chloroprene	126-99-8	<< 1 ppm
proprietary		-	< 0.02%

The respective thresholds for the inhalatory toxin, 2 chlorobutadiene, and the other impurity, for classification as a hazardous substance are 25% and 1% according to Worksafe Australia's *List of Designated Hazardous Substances* (1).

5. INDUSTRIAL USE

The notified polymer will be imported as dispersion in water, the polymer is the functional constituent of water based latex glue. The import volumes will be dependent on market penetration and the following estimates are upper limits:

year 1	> 1 tonnes
year 2	> 1 tonnes
year 3	> 1 tonnes
year 4	> 1 tonnes
year 5	> 1 tonnes

The product will be imported from the USA and sold without reformulation.

6. OCCUPATIONAL EXPOSURE

The notified chemical is only imported as a component of the latex formulations NPR9418 and NPR9368. These adhesives will be supplied to the manufacturing industry. There is no reformulation locally and occupational exposure during warehousing and packaging is unlikely, only occurring in the event of accidental spillage. Occupational exposure will mainly occur during use of the adhesive in the manufacturing industry. An estimated 90% of employees, or 3 659 individuals in this industry could come into contact with the adhesives containing the notified chemical. The introduction of this water based glue will reduce the exposure of these employees to the aromatic type glues currently in use.

The main route of occupational exposure will be dermal through handling and application of the adhesive. There is limited potential for accidental eye contact to occur. Inhalational exposure to the notified chemical will occur if the glue is applied via spray equipment and appropriate respiratory protection is not used. Occupational exposure to the adhesive after setting will also occur, however the relatively inert nature of the adhesive will limit concerns.

The polymer contains the residual monomer 2 chlorobutadiene (referred to as 2-chloro-1,3-butadiene on the Material Safety Data Sheet (MSDS)), this has an atmospheric exposure standard specified in Worksafe Australia's *Exposure Standards for Atmospheric Contaminants in the Occupational Environment* (2) of TWA 10 ppm (36 mg/m³) (refer to β-chloroprene). The second residual monomer has an exposure standard of TWA 100 ppm (410 mg/m³) (2). The low concentrations of the residual monomers in the notified polymer indicate that except in exceptional circumstances (e.g zero ventilation, confined area, headspace of drums) these exposure thresholds are unlikely to be attained.

7. PUBLIC EXPOSURE

The polymer will be imported and used in a water based latex form. The public will not be sold the products containing the wet latex form of the notified polymer. Public exposure to the wet latex form is not expected. In the event of a transport spill, the polymer should be treated with an absorbent material, allowed to dry and disposed to landfill.

Once applied the polymer solidifies and is considered inert. The public will be sold products containing solidified polymer. Waste polymer will be disposed of by landfill.

8. ENVIRONMENTAL EXPOSURE

. Release

The notified polymer is being imported as a pre-formulated product into Australia, therefore there is no risk of accidental spillage in Australia during the manufacturing stage.

The majority of the notified polymer will form part of the components of locally manufactured products. These articles will be sold to the general public. These products at the end of their useful life are likely to be disposed of to landfill.

It is envisaged that the product will generally be used in a semi-automatic process where the adhesive is applied using a controlled unit. This process is likely to result in a relatively small volume of losses.

The notifier noted that there are some manufacturers within the industry that have workers applying currently used solvent adhesives by brush. If the new product was utilised in this process, expected losses arising would be greater. However, the EPA believes that these losses would be localised and any spills would be cleaned up according to the MSDS ie treated with an absorbent material such as sand, sawdust or vermiculate, and then shovelled into disposal drums.

The major source of environmental release of the wet polymer is in the unlikely event of an accident during transport and/or handling. The latex can be treated with an adsorbent material and shovelled into disposal drums. If accidental spillage to waterways does occur, the polymer will disperse to a dilute concentration, eventually partitioning to sediment. Any wet product spilt during use that is not cleaned up will dry to a hardened form.

Estimated volumes left in the steel drums are between 1-5%. These residues are disposed of to landfill after allowing the water to evaporate and the product to solidify.

. Fate

The majority of the notified polymer will share the fate of the articles that it is used on ie disposal to landfill. Solidified residues will also be disposed of in this way. Polymer disposed of to landfill is unlikely to leach due to the expected very low water solubility of the solidified product. The notifier claims that hydrolysis or breakdown of closely related polymers over the last fifty years have been found to be extremely low.

Bioaccumulation of the notified polymer is not expected as its large molecular size (145 000 Daltons) is likely to inhibit membrane permeability and prevent uptake during exposure (3,4).

9. ASSESSMENT OF ENVIRONMENTAL EFFECTS

No ecotoxicological data were provided which is acceptable for polymers of low concern with a NAMW > 1 000 according to the Act.

10. ASSESSMENT OF ENVIRONMENTAL HAZARD

Environmental exposure to the notified polymer could occur when the articles containing the adhesive are disposed of. The final destination is likely to be landfill where the polymer can be expected to persist but remain immobile in the hardened form.

Losses during application of the adhesive are difficult to determine and will vary depending on the method of application. However, these losses are expected to be localised within the manufacturing plant. Any spillages will be cleaned up with an absorbent material which is then sent to landfill. Any wet product spilt during use that is not cleaned up will dry to a hardened form and also be sent to landfill.

Larger accidental spillages of the polymer should result in negligible hazard as it can easily be cleaned up with an adsorbent material. This material can then be sent to landfill. Minor spills to waterways will disperse to a dilute concentration, eventually adsorbing to sediment.

The low environmental exposure of the notified polymer as a result of the proposed use indicates that the overall environmental hazard should be negligible.

11. ASSESSMENT OF OCCUPATIONAL AND PUBLIC HEALTH AND SAFETY EFFECTS

No toxicology data were submitted for the notified polymer. The Material Safety Data Sheet (MSDS) lists the following acute toxicity details: oral LD₅₀, 7 900 mg/kg bw in rats; dermal LD₅₀ > 35 500 in rabbits; inhalational LC₅₀, 7 093 ppm in rats; slight skin irritant; moderate eye irritant and a skin sensitiser. The notified polymer has a NAMW of 145 000, which should preclude transmission across biological membranes such as skin and the gastrointestinal tract, and therefore is not expected to lead to significant toxicity. The notified polymer contains less than 1% of species with NAMW of less than 500 and 1 000.

Residual low molecular weight species constitute less than 1% of the notified polymer and at these levels are not expected to be hazardous. In addition the polymer is considered stable and is not expected to breakdown by thermal degradation under normal temperatures (below 200°C) and storage conditions.

The public will not be exposed to the polymer during its importation and use in the shoe manufacturing industry.

Although the public may come in contact with the solidified polymer in shoes, the properties of the polymer suggest that should exposure occur absorption is unlikely.

Given the high molecular weight, water solubility and stability, the notified polymer represents a low risk to public health.

The polymer contains the residual monomer 2 chlorobutadiene (referred to as 2-chloro-1,3-butadiene on the MSDS), this has an atmospheric exposure standard specified in Worksafe Australia's *Exposure Standards for Atmospheric Contaminants in the Occupational Environment* (2) of TWA 10 ppm (36 mg/m³) (refer to β-chloroprene). The second residual monomer, methyl methacrylate has an exposure standard of TWA 100 ppm (410 mg/m³) (2). The low concentrations of the residual monomers in the notified polymer indicate that except in exceptional circumstances (e.g zero ventilation, confined area, headspace of drums) these exposure thresholds are unlikely to be attained. In addition the levels of residual monomers and other hazardous material in the latex adhesive are below the level where the formulation would require a hazardous classification according to Worksafe Australia's *List of Designated Hazardous Substances* (1).

The introduction of water based adhesives such as those containing the notified polymer into industry will result in both environmental and occupational benefits through elimination of the aromatic solvent type of adhesives currently used. There is a low risk associated with the introduction of the notified polymer as dictated by the requirements of the Polymer of Low Concern category under which it is to be introduced. However, the adhesives containing the polymer have some potential to cause eye and skin irritation due to the component potassium hydroxide. The levels of potassium hydroxide are below the threshold for classification of the formulation as hazardous according to Worksafe Australia's *List of Designated Hazardous Substances* (1). It would however be prudent to limit possible eye or dermal exposure to the adhesives through the appropriate use of personnel protective equipment.

12. **RECOMMENDATIONS**

To minimise occupational exposure to the Polymer in NPR-9368 the following guidelines and precautions should be observed during the use of adhesives containing the notified polymer:

- Safe practices for handling any chemical formulation, should be adhered to - these include:
 - minimising spills and splashes;
 - practising good personal hygiene; and
 - practising good housekeeping and maintenance including bunding of large spills which should be cleaned up promptly with absorbents and put into containers for disposal.

It is expected that, in the industrial environment, protective clothing conforming to and used in accordance with Australian Standard (AS) 2919 (5) and protective footwear conforming to Australian/New Zealand Standard

(AS/NZS) 2210 (6) should be worn as a matter of course. In addition it is advisable when handling adhesives containing the notified polymer to wear chemical-type goggles (selected and fitted according to AS1336 (7) and meeting the requirements of AS/NZS 1337 (8)), impermeable gloves (AS 2161) (9) should be worn to protect against unforeseen circumstances. If the adhesive is to be applied using spray equipment then the appropriate respiratory device should be selected and used in accordance with AS/NZS1715 (10) and should conform to AS/NZS 1716 (11).

- A copy of the MSDS should be easily accessible to employees.

13. MATERIAL SAFETY DATA SHEET

The attached Material Safety Data Sheet (MSDS) for the notified chemical was provided in Worksafe Australia format (12).

This MSDS was provided by DuPont Australia Ltd as part of their notification statement. It is reproduced here as a matter of public record. The accuracy of this information remains the responsibility of Dupont Australia Ltd.

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. National Occupational Health and Safety Commission 1994, *List of Designated Hazardous Substances* [NOHSC:10005(1994)], Australian Government Publishing Service Publ., Canberra.
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3. Anliker, R., Moser, P. and Poppinger, D. 1988. "Bioaccumulation of dyestuffs and organic pigments in fish. Relationships to hydrophobicity and steric factors". *Chemosphere* 17(8):1631-1644.
4. Gobas, F.A.P.C., Opperhuizen, A. and Hutzinger, O. 1986. "Bioconcentration of hydrophobic chemicals in fish: relationship with membrane permeation". *Environmental Toxicology and Chemistry*, 5:637-646.

5. Standards Australia, 1987, *Australian Standard 2919 - 1987 Industrial Clothing*, Standards Association of Australia Publ., Sydney, Australia.
6. 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.
7. Australian Standard 1336-1982, *Recommended Practices for Eye Protection in the Industrial Environment*, Standards Association of Australia Publ., Sydney, 1982.
8. Australian Standard 1337-1984. *Eye Protectors for Industrial Applications*, Standards Association of Australia Publ., Sydney, 1984.
9. Australian Standard 2161-1978. *Industrial Safety Gloves and Mittens (excluding Electrical and Medical Gloves)*, Standards Association of Australia Publ., Sydney, 1978.
10. Standards Australia, Standards New Zealand, 1994. *Australian/New Zealand Standard 1715 - 1994 Selection, Use and Maintenance of Respiratory Protective Devices*. Standards Association of Australia Publ., Sydney, Australia, Standards Association of New Zealand Publ., Wellington, New Zealand.
11. Standards Australia/ Standards New Zealand, 1991. *Australian/New Zealand Standard 1716 - 1991 Respiratory Protective Devices*. Standards Association of Australia Publ., Sydney, Australia.
12. National Occupational Health and Safety Commission (1994). *National Code of Practice for the Completion of Material Safety Data Sheets*, [NOHSC:2011(1994)], AGPS, Canberra.