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NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME

FULL PUBLIC REPORT

Polyol P87-91

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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 .

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Director
Chemicals Notification and Assessment

FULL PUBLIC REPORT

Polyol P87-91

1. APPLICANT

Arco Chemicals Australia Pty Ltd of Suite 1 Level 3 845 Pacific Highway CHATSWOOD NSW 2067 has submitted a notification statement in support of the assessment of a synthetic polymer of low concern, Polyol P87-91.

2. IDENTITY OF THE POLYMER

Based on the nature of the chemical and the data provided, Polyol P87-91, is not considered to be hazardous. Therefore, the exact chemical identity has been exempted from publication in the Full Public Report.

Other name:	BE2341
Trade name:	Polyol P87-91
Molecular formula:	The notified substance is a complex grafted polymer and cannot be accurately defined by a single molecular formula.
Maximum percentage of low molecular weight species (polymers and oligomers) . (molecular weight < 1000):	0%
Means of identification:	polymer identified by infra-red spectroscopy, no spectra provided

Comments on identity

The polymer does not contain any charged groups and will not be cationic or anionic in the pH range of 4 to 9.

The notifier states that the polymer is a graft polymer. The molecular weight of the graft is designed to give a lowest number average molecular weight above a given threshold. This is because polyols with molecular weights less than the threshold do not produce polyurethane foams of sufficient density for the intended use(s). No data supporting these claims were made available.

3. PHYSICAL AND CHEMICAL PROPERTIES

The notified polymer will be imported into Australia as a 50/50 polymer/polyol solution. All physico-chemical properties relate to the polymer and not the polymer solution unless indicated.

Appearance at 20°C and 101.3 kPa:	white solid, formulation milky white liquid
Melting point:	softening point at ~100°C
Density:	>1040 kg/m^3 at 25°C
Water solubility:	1mg/L estimated, based on literature (1,2)
Flammability limits:	not flammable
Autoignition temperature:	does not autoignite
Explosive properties:	not explosive
Reactivity:	reacts exothermically with isocyanates
Particle size distribution:	not applicable only imported as a formulation (liquid)

Comments on Physico-Chemical Properties

The data provided is acceptable for a polymer of low concern

The water solubility of the notified polymer was estimated based on the gross difference in solubility parameters between the polymer and water.

The notifier claims that the polymer is stable under the conditions of use.

The polymer does not contain any functional groups that are intended to or can reasonably be anticipated to undergo further reaction.

While the polymer contains a number of amide linkages and cyanide groups these are not expected to hydrolyse under environmental conditions due to the low solubility of the polymer.

4. PURITY OF THE CHEMICAL

In isolation none of the residual monomers are at levels requiring a hazardous classification (3,4,5,6) for the notified polymer. In addition, when assessed in total, the levels are still below that requiring a hazardous classification (5). Of the residual monomers, ethenyl benzene (styrene) and 2-propenenitrile; (acrylonitrile), have atmospheric exposure standards of TWA 50ppm and 2ppm respectively. A third residual monomer has a TWA of 5ppm (7).

5. INDUSTRIAL USE

The polymer is to be imported as a 50% polymer 50% polyol solution in bulk carriers or ISO containers at a rate of 5 tonnes per annum over the first five years.

The notified polymer is intended for use in the manufacture of polyurethane foam for use in automobiles (seats and insulation) and furnishings.

6. OCCUPATIONAL EXPOSURE

The notified polymer will be imported as a 50/50 polymer/polyol solution. The solution will be pumped from the bulk carriers or ISO containers to a shore tank, from where it will be transferred to road tankers. Alternatively the ISO containers can be transported direct to the polyurethane foam manufacturing site. It will then be pumped into moulding foam machines or conveyor machines where it will be reacted with toluene diisocyanate (TDI) to produce polyurethane foam. These machines have automated metering and mixing equipment as well as extraction equipment designed to comply with Worksafe Australia's Model Regulations for the Control of Workplace Hazardous Substances (8,9) in relation to TDI.

Occupational exposure can occur during transfer operations at the dockside and during transfer from tankers or ISO containers at the customer facilities. As the solution containing the notified polymer is moved via pumps, exposure is most likely to occur while making and breaking connections. Between 6 and 9 personnel can potentially be exposed during these procedures. Occupational exposure may also occur during unloading, transport and warehousing through leakage or accidental spillage of the solution.

During foam manufacture the solution containing the notified polymer is mixed with TDI under controlled conditions. The equipment is designed to comply with standards based on the use of the hazardous chemical TDI. This will also minimise exposure to the notified polymer to the 20-30 personnel involved in the foam manufacture/moulding process. These personnel will be exposed, in the worst case, to the notified polymer for periods up to 14 hours/day for approximately 230 days/year.

7. PUBLIC EXPOSURE

The notified substance will not be sold to the public, but will be used only by industry for the production of polyurethane foams. Following importation the notified polymer will be transported by road tanker to nine locations in Victoria, New South Wales, Queensland and Western Australia. At these sites the notified substance will be reacted with toluene diisocyanate (TDI) to produce polyurethane foam. Due to the automated nature of the reaction process, exposure of the public to the notified polymer at this stage is expected to be minimal.

Public exposure to the notified chemical may occur during accidents in storage, transfer operations and transport. Exposure by this means is possible, as the product is a liquid, but it is practically insoluble in water (water solubility estimated at 1ppm). The Material Safety Data Sheet (MSDS) states that the product P87-91 has "normally low vapour pressures". Other than this the only way that the public would be exposed to the chemical would be by contact with an article fashioned from the foam containing the notified substance.

8. ENVIRONMENTAL EXPOSURE

. Release

Release of the notified polymer to the environment would only be significant in cases of spills. During transfers significant spills are not expected to occur. The MSDS and material handling instructions provide directions for the proper containment, collection and disposal of wastes in accordance with local regulations.

Washings from pump lines and road tankers will be collected in drums and disposed of to a licensed liquid waste disposal facility in each state, from where it will be either disposed of to an approved landfill or incinerated. The estimated loss from the washings is between 0.1-1%, typically below 0.5%. This corresponds to a loss 25 kg per annum based on a loss rate of 1% and the maximum import rate of 5 tonnes per annum. Used ISO tanks will be returned to the supplier (ARCO US) for reuse.

All the notified substance is intended for use in the manufacture of polyurethane foam for use in automobiles (seats and insulation) and furnishings. The foam is to be manufactured at nine sites across Australia (four in Victoria, two in New South Wales, two in Queensland and one in Western Australia). Off specification foam will be disposed of in an approved landfill.

When automobiles or furniture containing the foam reach the end of their useful life, the notified polymer, bound within the foam matrix, will be disposed of to landfill or incinerated.

. Fate

Most of the notified polymer is expected to be covalently bound within polyurethane foam products, with the final environmental fate being incineration or landfill.

Leaching of the polymer from landfill sites is not expected when it is bound within the inert foam matrix. Degradation of the foam in landfill sites is expected to be slow.

Any incineration of the notified polymer is expected to produce water and oxides of carbon and nitrogen.

A small amount (<25 kg per annum) of the unreacted polymer, washings of pump lines and from road tankers, will be disposed of to approved landfill or incinerated by licensed liquid waste disposal contractors. The low water solubility of the polymer indicates leaching from landfill sites is not expected.

9. ASSESSMENT OF ENVIRONMENTAL EFFECTS

Ecotoxicological data were not provided, which is acceptable for polymers of low concern according to the Act.

Bioaccumulation of the polymer is not expected due to its large molecular mass (10,11).

10. ASSESSMENT OF ENVIRONMENTAL HAZARD

It is anticipated that the amount of the notified polymer released to the environment will be low. Washings from pump lines will be disposed of to a licensed liquid waste disposal facilities, from where it will either be taken to an approved landfill or incinerated. Off specification foam will be disposed of in an approved landfill. Foam from automobiles or furnishings will be disposed of to landfill or incinerated. The low water solubility of the polymer and the inert nature of the polyurethane foam mean that the polymer is not expected to be mobile within landfill sites.

The hazard to the environment is restricted by the expected limited release, the low solubility in water of the polymer and its high molecular weight.

The environmental hazard posed by the polymer is rated as negligible when manufactured into foam products as the polymer will be incorporated into the foam matrix.

11. ASSESSMENT OF OCCUPATIONAL AND PUBLIC HEALTH AND SAFETY EFFECTS

Polyol P87-91 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 therefore is considered of low hazard to human health.

No toxicology data was submitted for the notified polymer. P87-91 has a number-average molecular weight (NAMW) of >1000, which should preclude transmission across biological membranes such as skin and the gastrointestinal tract, and therefore is not expected to lead to significant toxicity; there are no polymer species with a NAMW <1000. The NAMW for the graft polymer has to exceed 1000 to produce polyurethane foams of sufficient density for the intended use. The product contains <100 ppm styrene, which is a CNS depressant and moderate eye and skin irritant, and <26 ppm acrylonitrile, a known animal and possible human carcinogen, which is also a severe eye and skin irritant; and <25ppm of a third monomer which is a possible carcinogen and mutagen however, these concentrations are very low and trace substances are not expected to lead to significant toxicity. They are below the levels that would require that P87-91 be given a hazardous classification. The notifier's MSDS claims that "There may be one or more specific effects for one or more ingredients which are trade secrets but not hazardous according to Australian Hazardous Classification Criteria [NOHSC:1008(1994)]", this refers to the third monomer which as stated above is below the hazardous threshold.

The MSDS states that hazardous polymerisation “is not expected to occur”. However, “heat from fire may melt, decompose, and generate flammable vapours.... melting alone may cause steam explosion on contact with water”. The MSDS states that thermal decomposition and combustion of the notified polymer “may produce oxides of carbon, oxides of nitrogen, and other toxic gases”, but not give any other information about the likely composition or toxicity of decomposition products.

According to the MSDS, there is no evidence of adverse effects from the notified polymer in relation to ingestion, skin contact or skin absorption. It states that the product “may cause minor eye irritation”, although there are warnings for first aid procedures which seem more in keeping with a moderate to severe eye irritant. The product is “not expected to present a respiratory hazard due to normally low vapour pressures”.

The public will not normally be exposed to the notified polymer during its importation and formulation into foam and production of articles. The public may be exposed directly or indirectly to articles made from polyurethane foam produced by chemical reaction of TDI with the notified polymer.

Public exposure to the notified polymer during accidents in storage, transfer/pumping and transport is likely to be limited in extent.

No information is available on the identity or toxicological properties of the notified polymer, other than basic information contained in the MSDS. However, the properties of the chemical suggest that should exposure occur absorption is unlikely, resulting in low risk to public health.

Occupational exposure will be limited to accidental spillage of the polymer solution and during transfer operations. The notified polymer has low levels of hazardous residual monomers that are below levels requiring a hazardous classification, however, the atmospheric exposure standards to the residual monomers, ethenyl benzene (styrene) and 2-propenenitrile; (acrylonitrile) and a third monomer of TWA 50ppm, 2ppm and 5ppm respectively should be observed. The normally low vapour pressures of the polymer solution should result in low atmospheric levels of the two monomers however care should be taken in confined spaces. Exposure during polyurethane foam manufacture will be limited by safety measures required to handle the other foam component TDI. Occupational exposure to the notified polymer in foam will be limited due to the incorporation of the polymer into the foam.

On the basis of available information Polyol P87-91 would not be classified as hazardous according to the criteria of Worksafe Australia (6), however as no toxicological information was supplied with the submission there is no data to confirm this.

12. RECOMMENDATIONS

To minimise occupational exposure to Polyol P87-91 the following guidelines and precautions should be observed:

- local exhaust ventilation or good natural ventilation should be available during transfer operations.

- if engineering controls and work practices are insufficient to reduce exposure to Polyol P87-91 to a safe level, then:

  - if ventilation is insufficient to reduce atmospheric exposure to a safe level, such as potentially may occur during maintenance operations in confined spaces, then the appropriate respiratory device should be selected and used in accordance to Australian Standard/ New Zealand Standard (AS/ NZS) 1715 (12) and should comply to AS/NZS 1716 (13). Work in confined spaces should be in accordance with AS/2865 (14).

  - eye protection should be selected and fitted in accordance to AS 1336 (15) and meet the requirements of AS/NZS 1337 (16).

  - industrial clothing should conform to the specifications detailed in AS 2919 (17) and AS3765 (18).

  - industrial gloves should conform to the standards detailed in AS 2161 (19).

- safe practices, as should be followed when 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.

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

13. MATERIAL SAFETY DATA SHEET

The MSDS for the notified chemical was provided in accordance with the *National Code of Practice for the Preparation of a Material Safety Data Sheets* (20).

This MSDS was provided by the applicant 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 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.

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