File No: NA/351

Date: February 1996

NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME

FULL PUBLIC REPORT

POLYMER IN ALDECRYL 987

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Director
Chemicals Notification and Assessment

FULL PUBLIC REPORT

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1. APPLICANTS

Hoechst Australia Limited of 606 St. Kilda Road MELBOURNE VIC 3004 and Croda Herberts Pty Ltd of 15-23 Melbourne Road RIVERSTONE NSW 2765 have submitted a limited notification statement accompanying their application for assessment of Polymer in Aldecryl 987.

2. IDENTITY OF THE CHEMICAL

Based on the nature of the chemical and the data provided, Polymer in Aldecryl 987 is considered to be non-hazardous. Therefore the chemical name, CAS number, molecular and structural formulae and spectral data have been exempted from publication in the Full Public Report and the Summary Report.

Trade name:	Aldecryl 987
Number-average molecular weight:	> 1000
Method of detection and determination:	infra-red spectroscopy

3. PHYSICAL AND CHEMICAL PROPERTIES

The polymer is imported into Australia as a component in a petroleum solvent based liquid and is never isolated. The properties given below are those of the liquid unless otherwise specified.

Appearance at 20°C and 101.3 kPa:	colourless liquid
Odour:	characteristic solvent odour
Melting Point/Boiling Point:	not measurable (polymer)
Density:	1010 kg/m^3
Vapour Pressure:	the polymer has no detectable vapour pressure (OECD method 104)
Water Solubility:	< 0.01 g/L at 20°C (polymer)

Partition Co-efficient:	not applicable (the polymer is insoluble in water)
Hydrolysis as a function of pH:	not applicable (the polymer is insoluble in water)
Dissociation Constant:	not applicable (the polymer is insoluble in water)
Flash Point:	42°C (for Aldecryl 987)
Flammability Limits:	not applicable for the polymer, which has no detectable vapour pressure.
Combustion Products:	oxides of carbon
Pyrolysis Products:	oxides of carbon
Decomposition Products:	oxides of carbon
Autoignition Temperature:	not applicable
Explosive Properties:	none known
Reactivity/Stability:	should be kept away from oxidising agents and strongly alkaline or acidic materials to avoid exothermic reactions.
Particle size distribution:	not applicable

Comments on Physico-Chemical Properties:

Acrylate polymers with an NAMW > 1000 are normally considered to be insoluble in water. The test carried out by the notifier to determine water solubility as being < 0.01 g/L appears likely to be a measure of the water accommodated fraction. True solubility of the polymer would be expected to be less than 1 mg/L.

The polymer contains esters on the side chains which are potentially hydrolysable. However, due to the low solubility in water, these are not expected to hydrolyse under normal environmental conditions.

It is noted that the polymer contains a small number of acid groups in the side chain. However, a dissociation constant would be hard to measure due to low solubility in water and typical acidity is expected, together with an increase in solubility in basic conditions.

No adsorption/desorption studies have been performed. Since the polymer is insoluble in water and has no detectable vapour pressure, a relatively low migratory tendency of the chemical into the air, water and soil are to be expected.

4. PURITY OF THE CHEMICAL

Degree of purity: > 99%

Toxic or hazardous impurities: nil

Non-hazardous impurities (> 1% by weight): nil

Maximum content of residual monomers: < 1.9%

Additives/Adjuvants: nil

5. USE, VOLUME AND FORMULATION

Aldecryl 987 is to be used as a component of an industrial coating. Greater than 1 tonne of the polymer will be imported per annum.

6. OCCUPATIONAL EXPOSURE

The notified polymer will be imported as a solution in solvent, which will be incorporated into locally manufactured industrial coating products.

The resin solution will be transported in sealed 200 kg drums by road to the premises of the customer, where formulation will take place. The final products will be sold to industrial trade customers.

Categories of workers potentially exposed to the polymer include transport and storage workers, personnel involved in formulation of the final product, product application and equipment cleaning as well as personnel involved in waste disposal.

At the formulator's site it is expected that up to 35 personnel may be exposed to the notified polymer during formulation and repackaging. Of these, 27 are expected to be involved in formulation, 8 in quality control and research and development. These personnel are expected to be exposed for about 2 hrs/day, 20 days/year. Up to 35 personnel may be involved in training and demonstration of the new product for 4hrs/week for approximately three months. Minimal exposure of other workers may occur, these being involved in supervision, storage, transport and drum recycling.

Formulation is carried out in a steel mixing vessel by mechanical lifting of the drums to allow gravity feed of the solution, followed by addition of pigment, solvents and additives. When mixing is complete the vessel is closed, and the mixture is pumped through an enclosed bead mill. The mixture is then pumped into another mixing

vessel where the viscosity is adjusted. Finally the mixture is pumped into machinery which fills the finished product into 4 L containers.

Residues of the polymer are removed by washing the equipment with solvents. Wash solvent is sent to a solvent recycler, who will reclaim the solvent for future use.

Dust and vapour extraction systems will be in use in the formulation area, all mixing vessels are closed, except when ingredients are being added and the mills which are to be used have water cooling jackets to minimise solvent losses due to heating.

The notifiers recommend that application of the final product be conducted in spray booths equipped with exhaust ventilation and filtering systems. Respirators with a remote air supply would normally be used as isocyanate hardener is added to the final product immediately prior to application.

7. PUBLIC EXPOSURE

Aldecryl 987 will be incorporated into industrial coatings and will be available to trade customers only. The coating will be applied in spray booths, and the public will not be exposed to the notified polymer. Adequate measures are described by the notifier to ensure the general public are not exposed to the notified polymer during the formulation or coating procedures. The public will come into contact with the cured paint film on the surface of articles, and minimal exposure may occur if the coating is accidentally removed from the surface of the article. In such instances the polymer, which has a high number average molecular weight, and is immobilised in the hardened coating, should pose negligible hazard to the public.

Minor public exposure may result from disposal of unused resin, or accidental spillage of the notified polymer during transport and storage, and during formulation. However, adequate measures are described by the notifier to minimise the risk of public exposure during formulation, disposal, or in the event of accidental spillage.

8. ENVIRONMENTAL EXPOSURE

. Release

It is expected that no polymer will be released to the environment at the site of reformulation. Residues of Aldecryl 987 will remain in drums after discharge into mixing vessels. These drums are sent to a drum recycler. Residues of finished product containing Aldecryl 987 will remain in mixing vessels and filling equipment. These residues are removed by rinsing of equipment with wash solvent, which is sent to a solvent recycler. To prevent accidental release to water, drums of Aldecryl 987 are to be stored in a bunded area and all on-site drainage leads to a "first flush" drainage system. This prevents entry of polluted water into either the stormwater drainage system or the sewerage system.

The finished product containing Aldecryl 987 will be mixed with isocyanate hardener and applied to articles by spray painting in spray booths. The notifier anticipates

high volume-low pressure spray guns will be used, which are approximately 75% efficient in applying paint, ie. 25% overspray, however, overspray could reach as high as 50% if this is not the case. Most of the overspray is either trapped in air filters or in a water trap. The air filters, containing the collected dry overspray, are bagged from time to time and then disposed of by a waste disposal contractor according to statutory requirements. The water traps use a chemical coagulating agent to precipitate the overspray which is collected in a sump. The sludge from the sump is periodically removed and disposed of by a waste disposal contractor according to statutory requirements.

. Fate

The fate of the polymer is either to be bound to an article or disposed of by landfill/incineration. After coatings containing the polymer are applied to the article, a clear topcoat is then applied, which when cured forms an inert, highly crossed linked polyurethane film. This remains with the article. Any fragments, chips of the cured paint that occur (due to chipping, accidents etc.) will be inert and form part of the sediments.

Empty cans containing residues of the coating are to be sent to a drum recycler who will either dispose of the cans (ie landfill) or recycle them according to statutory requirements. In either case the residues in the cans are likely to be treated and the insoluble polymers disposed of by landfill/incineration. Likewise, solid residues of the polymer from the solvent recycler are likely to be disposed of by landfill/incineration.

9. EVALUATION OF TOXICOLOGICAL DATA

Toxicological data are not required for polymers of number-average molecular weight (NAMW) > 1000 according to the *Industrial Chemicals (Notification and Assessment) Act, 1989* (the Act) and no data were submitted for the notified polymer.

10. ASSESSMENT OF ENVIRONMENTAL EFFECTS

The notifier has not presented any ecotoxicity results for the polymer. This is acceptable as ecotoxicity tests are not required for a polymer with NAMW > 1000 according to the Act.

The polymer is not expected to show ecotoxicity effects as a result of the high molecular weight and expected low water solubility (1).

11. ASSESSMENT OF ENVIRONMENTAL HAZARD

The environmental hazard from the polymer, when sealed under the topcoat and cured, is rated as negligible.

The environmental hazard during the processing of Aldecryl 987 into the coating is expected to be low. While it is expected there should not be any release of the polymer to the environment at the site of reformulation, measures are in place in the case of accidental release. All residues during this process will be disposed of in an acceptable manner during named operations. The coating containing the polymer will be formulated for use in spray guns. The notifier expects that most end users will use high volume low pressure spray guns, which it is claimed by the company to obtain approximately 75% spray efficiency. Efficiency may be as low as 50% when other types of spray guns are used. Therefore of the maximum amount of the polymer imported, between 25 and 50% will be lost as overspray. This overspray is expected to be collected in either air filters or in water traps. As there are a large number of different users, it is not possible to quantify the amount of polymer trapped in each of these systems, however, almost all of the overspray is expected to be collected for disposal.

As the waste trapped in the air filters is expected to dry out and cure before disposal, the hazard from this material is expected to be negligible when it is landfilled or incinerated. Any spray droplets not trapped by the air filter will dry out and polymerise to an inert particle. The waste water from the water trap is expected to be discharged to the sewer, where it will be diluted by several factors of magnitude and/or partition to the sludge and become trapped in the solids at the sewage treatment works. The solids are disposed of by landfill or incineration.

Incineration of the polymer will generate oxides of carbon as well as water. The environmental hazard can be rated as negligible. As the polymer is expected to be insoluble in water, the polymer waste consigned to landfill is unlikely to leach and will stay in the landfill. Hydrolysis of the polymer is expected to be extremely slow due to the low solubility in water. The environmental hazard from the disposal of paint waste containing the polymer is rated as low.

Instructions in the MSDS (spills should be cleaned up by collecting and containing with non-combustible absorbent materials) are adequate to limit the environmental exposure from spills etc. and therefore the environmental hazard from possible accidental spills should be low.

The overall environmental hazard from the use of the polymer is rated as low.

12. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY EFFECTS

As the notified polymer has a number-average molecular weight (NAMW) > 1000, it is unlikely to be able to cross biological membranes and cause systemic effects. The polymer contains residual levels of some hazardous monomers. These are present at levels well below the cut-off concentrations necessary to classify the polymer as a hazardous substance according to Worksafe Australia's *Approved Criteria for Classifying Hazardous Substances* (2) and are therefore not expected to cause any significant toxicological concerns. The polymer contains low molecular weight species (NAMW < 1000). The majority of these low molecular weight species have a NAMW above 500 and, therefore, may be expected to be poorly absorbed.

The notified chemical will arrive in Australia as a component of a solution. As the polymer is available in liquid form, skin and eye contact will be the main sources of occupational exposure during formulation, top coat preparation, equipment loading and equipment cleaning. Inhalational exposure during these activities is unlikely as the polymer vapour pressure is expected to be low at room temperature. Inhalational exposure during application, however, will be significant as the spray process will generate aerosols.

The use of dust/vapour extractors will minimise worker exposure during formulation. During application of the final product a well ventilated spray booth for spray applications will reduce worker exposure to overspray. Therefore, worker exposure to the notified chemical should be low when the paint product is formulated and used in the proposed manner.

The risk of adverse occupational health effects is expected to be low, due to low exposure levels as a result of engineering controls used during formulation and end use, and the likely low hazard of the notified polymer. Precautions taken to protect against the solvents should protect against the notified polymer

The notified polymer will be incorporated into industrial coatings and used in spray booths, and will not be available to the general public. The public will come into contact with the cured film on the surface of articles, and minimal exposure may occur if the paint film is accidentally removed from the surface of the article. However, the polymer, which has a high number average molecular weight, will be immobilised in the hardened film and as such would pose a negligible public risk. The potential for minor public exposure exists during formulation, transport and disposal of the polymer if accidentally spilt. This is minimised by the recommended practices (in the MSDS) during formulation, storage and transportation.

13. RECOMMENDATIONS

To minimise occupational exposure to the notified polymer in Aldecryl 987 the following guidelines and precautions should be observed:

. If engineering controls and work practices are insufficient to reduce exposure to a safe level, then:

  - The appropriate respiratory device should be selected and used in accordance to Standard/New Zealand Standard (AS/NZS) 1715 (3) and should conform to AS/NZS 1716 (4).

  - Eye protection should be selected and fitted in accordance to Australian Standard (AS) 1336 (5) and meet the requirements of AS/NZS 1337 (6).

  - Industrial clothing should conform to AS 2919 (7).

  - Impervious industrial gloves should conform to AS 2161 (8).

  - All occupational footwear should be selected in accordance with and conform to AS/NZS 2210 (9).

. Particular care should be taken to avoid spillage or splashing of the notified chemical.

. Good personal hygiene should be practised to minimise the potential for ingestion.

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

14. MATERIAL SAFETY DATA SHEET

The attached MSDS for Aldecryl 987 was provided by Hoechst Australia Ltd and Croda Herberts Pty Ltd as part of their notification statement. It is reproduced as a matter of public record. The accuracy of this information remains the responsibility of Hoechst Australia Ltd and Croda Herberts Pty Ltd.

15. REQUIREMENTS FOR SECONDARY NOTIFICATION

Under the *Industrial Chemicals (Notification and Assessment) Act 1989*, secondary notification of Aldecryl 987 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. J. V. Nabholz, P. Miller and M. Zeeman, "Environmental Risk Assessment of New Chemicals Under the Toxic Substances Control Act TSCA Section Five", in *Environmental Toxicology and Risk Assessment*, W. G. Landis, J. S. Hughes and M. A. Lewis (Eds), pp 40-55

2. National Health and Safety Commission, *Approved Criteria for Classifying Hazardous Substances*, NOHSC:1008 (1994), AGPS, Canberra, Australia

3. 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.

4. Standards Australia, Standards New Zealand, 1991, *Australian/ New Zealand Standard 1716 - 1991 Respiratory Protective Devices,* Standards Association of Australia Publ., Sydney, Australia, Standards Association of New Zealand Publ., Wellington, New Zealand.

5. Standards Australia, 1994, *Australian Standard 1336-1994, Recommended Practices for Eye Protection in the Industrial Environment*, Standards Association of Australia Publ., Sydney, Australia.

6. Standards Australia, Standards New Zealand 1992, *Australian/ New Zealand Standard 1337-1992, Eye Protectors for Industrial Applications*, Standards Association of Australia Publ., Sydney, Australia, Standards Association of New Zealand Publ. Wellington, New Zealand.

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

8. Standards Australia, 1978, *Australian Standard 2161-1978, Industrial Safety Gloves and Mittens (excluding Electrical and Medical Gloves*), Standards Association of Australia Publ., Sydney, Australia.

9. 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.