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**NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION
AND ASSESSMENT SCHEME**

FULL PUBLIC REPORT

POLYURETHANE ACRYLATE PREPOLYMER DESOLITE 950-109A

This Assessment has been compiled in accordance with the provisions of the *Industrial Chemicals (Notification and Assessment) Act 1989*, and Regulations. This legislation is an Act of the Commonwealth of Australia. The National Industrial Chemicals Notification and Assessment Scheme (NICNAS) is administered by Worksafe Australia which also conducts the occupational health & safety assessment. The assessment of environmental hazard is conducted by the Department of the Environment, Sport, and Territories and the assessment of public health is conducted by the Department of Health, Housing, Local Government and Community Services.

For the purposes of subsection 78(1) of the Act, copies of this full public report may be inspected by the public at the Library, Worksafe Australia, 92-94 Parramatta Road, Camperdown NSW 2050, between the hours of 10.00 a.m. and 12.00 noon and 2.00 p.m. and 4.00 p.m. each week day except on public holidays.

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Director
Chemicals Notification and Assessment

FULL PUBLIC REPORT**POLYURETHANE ACRYLATE PREPOLYMER DESOLITE 950-109A****1. APPLICANT**

Mirotone Pty Ltd of 21 Marigold Street, Revesby, NSW 2212.

2. IDENTITY OF THE POLYMER

Based on the nature of the chemical and the data provided, Polyurethane acrylate prepolymer DeSolite 950-109A is not considered to be hazardous. Therefore, the details of chemical name, molecular and structural formulae, spectral data, impurities, exact manufacture and import volume have been exempted from publication in the Full Public Report and the Summary Report.

Other names: Polyurethane acrylate
prepolymer DeSolite 950-109A

Urethane Acrylate Pre-polymer
Urethane Acrylate Oligomer

**Chemical Abstracts Service
(CAS) Registry No.:**

Not available

Trade name:

DeSolite 950-109A
(refers to the product
containing the notified
polymer)

**Method of detection
and determination:**

The polymer can be
separated and identified by
gel permeation chromatography

3. PHYSICAL AND CHEMICAL PROPERTIES

Appearance at 25°C and 101.3 kPa:	Yellow viscous liquid
Odour:	Acrylate odour
Glass-transition temperature:	Not determined
Density:	1100 kg/m ³
Vapour pressure:	Not determined
Water Solubility:	0.007 g/L at 20°C 0.03 g/L at 30°C
Hydrolysis as a function of pH:	Not determined, due to low solubility
Partition co-efficient (n-octanal/water) log P_o/w:	Not determined
Adsorption/Desorption:	Not determined
Dissociation Constant:	Not determined
Flash point:	>100°C
Flammability Limits:	Not determined
Autoignition Temperature:	Not applicable
Explosive Properties:	Not applicable
Reactivity/Stability:	Stable under normal conditions of storage and use
Particle size distribution:	Not applicable

- **comments on physico-chemical properties**

Determination of the melting point for this polymer was not possible. The notifier submits that amorphous polymers in general do not exhibit well defined melting points. This is acceptable.

No measurement was made of vapour pressure, as determination of the percentage of non-volatile matter indicated a non-volatile component of 100%.

No hydrolysis data were presented. The presence of urethane groups indicate that hydrolysis is possible. However, given the relatively low water solubility and exposure of the polymer, this is unlikely under environmental conditions.

Examination of the structural formula does not indicate the presence of any functional groups likely to dissociate.

Partition co-efficient and adsorption/desorption data were not supplied, on the basis of the low solubility of the polymer. This is acceptable.

4. PURITY OF THE CHEMICAL

Degree of purity: ~99%

5. INDUSTRIAL USE

The notified polymer is used to form a secondary coating over an initial polymer base around optical fibre bundles.

The intended import volume is estimated to be > one tonne per annum over the next five years.

6. OCCUPATIONAL EXPOSURE

The notified polymer as an ingredient in DeSolite 950-109A will be imported in 4 kg packages. No more than five workers will be involved in importation, transport and storage of the notified polymer in any one delivery.

Approximately 72 workers will be exposed to the notified polymer at the optical fibre manufacturing plant, operated on two, twelve-hour shifts a day. The coating of optical fibre is carried out by a flow cup mechanism. It is an automated and enclosed process. DeSolite 950-109A is introduced into the system through a pressure pot of 8 kg capacity. The pressure pot is replenished

2 to 3 times every 24 hours. The exposure due to each filling operation is estimated to be approximately 90 seconds and no more than two workers will be involved in the process. The total number of workers handling the notified polymer at any one time will be no more than six.

7. PUBLIC EXPOSURE

There is negligible potential for public exposure to DeSolite 950-109A during manufacturing operations. The uncured polymer enters the public domain only during transport to the manufacturing site and when contaminated empty containers are plastic bagged and disposed of by landfill.

Public exposure to finished optical fibre cables is also improbable, as these will be located underground. Furthermore, the notified polymer will be cured and encapsulated within an inert coating from which it cannot be absorbed.

8. ENVIRONMENTAL EXPOSURE

. Release

The registrant claims that the polymerisation process does not yield any release of material, by-products or contaminants to the environment, and that all raw material is consumed in the process. Residues in empty containers form the principal wastes.

Release is also possible during transport of the polymer from site of importation to the manufacturing plant, or in the event of disposal of spilt material in the workplace. The company does not consider that such releases are likely to lead to significant environmental exposure.

No releases are expected to occur from the final formed polymer coating for optical fibres.

Wastes resulting from formulation and coating processes, and residues remaining in containers and materials will be placed in plastic bags, and disposed of to landfill by commercial trade waste companies.

. **Fate**

The low solubility of the substance and high molecular weight should ensure that residues remain immobile in landfill or spillage areas. Curing of the polymer will only serve to increase the molecular weight, and decrease the solubility still further. Both these factors will also result in lowered biodegradation potential.

The required stability of the product should ensue that it remains fairly stable in the environment, and the company claims there is no evidence of breakdown of the coating after 20 years.

The submission contains a certificate claiming a Biological oxygen demand (BOD) of 680 mg.L⁻¹ and a Chemical Oxygen Demand (COD) of 201%. These data cannot be assessed in the absence of a test report.

Degradation products as a result of decomposition or depolymerisation are not known.

Should the coating be burnt, carbon dioxide, isocyanates, hydrogen cyanide and toxic smoke would be produced (based on the chemical structure).

9. EVALUATION OF TOXICOLOGICAL DATA

No toxicology data have been provided for Polyurethane acrylate prepolymer DeSolite 950-109a which is acceptable under the Act for a polymer with number average molecular weight >1000.

10. ASSESSMENT OF ENVIRONMENTAL EFFECTS

No ecotoxicological data was provided, which is acceptable for limited polymer notifications.

11. ASSESSMENT OF ENVIRONMENTAL HAZARD

DeSolite 950-109A is an urethane acrylate that would not be expected to have ecotoxic properties. The high molecular weight and low water solubility of the polymer are expected to minimise risk to aquatic organisms in the event of accidental spillage.

The site-limited use of this polymer and its final form (a cured coating around optic fibres that will be buried) further restrict the potential for environmental hazard.

The MSDS gives appropriate directions for treatment of spills.

12. ASSESSMENT OF OCCUPATIONAL AND PUBLIC HEALTH AND SAFETY EFFECTS

There is no information on human health effects of the notified polymer. No toxicology data were submitted which is acceptable for polymers with NAMW >1000.

The notified polymer is non explosive and stable.

The notified polymer has a NAMW >1000 and is therefore unlikely to cross biological membranes and cause significant systemic effects. However, it contains 14% (w/w) low molecular weight (<1000 and >500) species which may be hazardous, therefore contact with the polymer should be avoided. The polymer also contains a total of ~0.3% hazardous residual monomers/additives. The concentration of each impurity however is below the cut off concentration for classifying the polymer as a hazardous substance.

During filling of the pressure pot the most likely route of exposure to the notified polymer is by the dermal route.

The notified polymer will be present in a mixture containing other more hazardous chemicals, steps taken to minimise exposure to these will ensure exposure to the notified polymer to be low. Under normal use conditions given the low hazard and low exposure, the risk of adverse health effects due to use of the notified polymer is low.

There is negligible potential for public exposure to the notified polymer, either during manufacturing operations or from contact with finished optical fibre cables.

12. RECOMMENDATIONS

To minimise occupational exposure to Polyurethane acrylate prepolymer DeSolite 950-109A the following guidelines and precautions should be observed:

- . if engineering controls and work practices are insufficient to reduce exposure to a safe level, the following personal protective equipment which comply with Australian Standards should be worn such as respiratory protection devices (AS 1715-1991 (1), AS 1716-1992 (2)), safety glasses or face shields (AS 1336-1982 (3), AS 1337-1982 (4)), laminated multilayer plastic gloves and nitrile-butadiene-rubber gloves (AS 2161-1978 (5)) and protective clothing (AS 3765.1-1990 (6), AS 3765.2-1990 (7));
- . good personal hygiene should be practiced; and
- . a copy of the Material Safety Data Sheet (MSDS) for DeSolite 950-109A should be readily accessible to employees.

13. MATERIAL SAFETY DATA SHEET

The Material Safety Data Sheet (MSDS) for DeSolite 950-109A containing the notified polymer (Attachment 1) was provided in Worksafe Australia format (8). This MSDS was provided by Mirotone Pty 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 Mirotone Pty Ltd.

14. REQUIREMENTS FOR SECONDARY NOTIFICATION

Under the *Industrial Chemicals (Notification and Assessment) Act 1989*, secondary notification of Polyurethane acrylate prepolymer DeSolite 950-109A 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. Australian Standard 1715-1991, "Selection, Use and Maintenance of Respiratory Protective Devices" Standards Association of Australia Publ., Sydney 1991.
2. Australian Standard 1716-1991, "Respiratory Protective Devices" Standards Association of Australia Publ., Sydney 1991.
3. Australian Standard 1336-1982, "Recommended Practice for Eye Protection in the Industrial Environment", Standards Association of Australia Publ., Sydney, 1982.
4. Australian Standard 1337-1984, "Eye Protectors for Industrial Applications", Standards Association of Australia Publ., Sydney, 1984.
5. Australian Standard 3765.1-1990, "Clothing for Protection Against Hazardous Chemicals, Part 1: Protection Against General or Specific Chemicals", Standards Association of Australia Publ., Sydney, 1990.
6. Australian Standard 3765.2-1990, "Clothing for Protection Against Hazardous Chemicals, Part 2: Limited Protection Against Specific Chemicals", Standards Association of Australia Publ., Sydney, 1990.
7. Australian Standard 2161-1978, "Industrial Safety Gloves and Mittens (excluding Electrical and Medical Gloves)", Standards Association of Australia Publ., Sydney, 1978.
8. National Occupational Health and Safety Commission, *Guidance Note for the Completion of a Material Safety Data Sheet*, 2nd. edition, AGPS, Canberra, 1990.