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NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME

FULL PUBLIC REPORT

POLYMER IN POLYLITE 44-342

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 Human Services and Health.

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Director
Chemicals Notification and Assessment

FULL PUBLIC REPORT

POLYMER IN POLYLITE 44-342

1. APPLICANT

A C Hatrick Chemicals Pty Ltd of 49 - 61 Stephen Rd, Botany, NSW 2019 has submitted a limited notification for assessment of the polymer in Polylite 44-342.

2. IDENTITY OF THE CHEMICAL

Polymer in Polylite 44-342 is not considered to be hazardous based on the nature of the chemical and the data provided. Therefore the chemical name, CAS number, molecular and structural formulae and exact molecular weight have been exempted from publication in the Full Public Report and the Summary Report

Trade name: Polylite 44-342 is an 81% solution of the notified polymer in styrene

Number-average molecular weight: > 1000

Maximum percentage of low molecular weight species (molecular weight < 1000): 17.7%

Method of detection and determination:

Infrared spectroscopy

3. PHYSICAL AND CHEMICAL PROPERTIES

Appearance at 20°C and 101.3 kPa:	colourless, viscous liquid
Boiling Point:	it is stated that polymerisation would occur before the polymer boiled
Density:	1187 kg/m^3
Water Solubility:	expected to be low
Autoignition Temperature:	thermal degradation is expected at temperatures above 250°C. Polymerisation in the styrene monomer solution, Polylite 44-342, will take place at temperatures above 100°C
Reactivity/Stability:	expected to be stable

Comments on physico-chemical properties

No specific melting point was determined as the substance is a very viscous liquid at 20°C and 101.3 kPa. As heat is applied the viscosity progressively decreases.

The water solubility was not supplied on the grounds that the molecular weight and structure of the polymer suggest that it will not be soluble. Polyesters are generally regarded as insoluble, and therefore the omission of this data is acceptable.

Data for hydrolysis and partition co-efficients also were not supplied, based on the expected insolubility of the polymer. Hydrolysis is theoretically possible at acidic or alkaline pH, given the presence of ester linkages, but is not expected to occur in the environmental pH range.

Adsorption/desorption data were not supplied, based on the non-volatile nature and viscosity of the polymer. Both of these factors should limit the mobility of the polymer through soils, and therefore it could be expected to remain on sediments during accidental spills. The omission of data in this regard is acceptable. A small amount of free carboxylic acids would be expected following polymerisation.

Tests to determine the dissociation constant were not conducted, becasue of the expected low solubility of the polymer. Omission of this data is acceptable.

4. PURITY OF THE CHEMICAL

Degree of purity: 98.7%

Toxic impurities:
(> 0.1% by weight): None

Non-hazardous impurities
(> 1% by weight): None

Maximum content
of residual monomers: 1.25%

Additives/Adjuvants: None

5. INDUSTRIAL USE

The notified polymer is the main constituent used in the manufacture of polyester tools.

6. OCCUPATIONAL EXPOSURE

The notified polymer will be manufactured at an initial rate of 4 tonnes per year rising to 7.5 tonnes per year by the fifth year.

At the site of manufacture a maximum of 20 persons are involved in manufacturing the chemical, sampling, packing, quality control, storage and transportation. The maximum duration of exposure during manufacture is 2 hours per day on one day per year.

The notified polymer is manufactured in a sealed reactor. Following manufacture, the hot resin is pumped into a thinning tank containing styrene. After adjustment to specification, the product is filtered through a Cuno filter or Plate and Frame filter directly into 200 litre steel drums and the drums are sealed. The Cuno filter is a sealed unit and filtration using the Plate and Frame filter is carried out under a vapour extractor system. Drumming off is conducted using metal lines and there is an exhaust system over the drumming area.

Polylite 44-342 is mixed with three other resins to produce the final product which is then stored in 200 L drums prior to transport to other company sites or to customers. The final concentration of the notified chemical in the mixed resin system is 7.5%.

During use, the notified polymer in styrene is mixed with alumina trihydrate and fiberglass and the mixture sprayed onto a mould which is the eventual shape of the polyester tool to be fabricated. Once applied the resin system polymerises to an inert crosslinked plastic.

7. PUBLIC EXPOSURE

While public contact with polyester tools made from the notified polymer may be extensive, public exposure to the notified polymer is expected to be negligible

8. ENVIRONMENTAL EXPOSURE

. Release

Samples taken from the reactor during the manufacturing process for testing are recycled into the mixture. Filter residues are sent to approved landfill after treatment with peroxide catalysts (which serves to increase the molecular weight by promoting polymerisation). Part drums left over from one production run are used in subsequent runs.

It is stated that approximately 1% of the polymer will be lost in the manufacturing process. This, combined with an additional estimated 1% remaining as residues in drums mean that a total of 150 kg of the polymer will be pretreated with a catalyst and sent to landfill for disposal.

After manufacturing, the polymer is packed in 200 L steel drums. After mixing with other polymers to form Polylite 33-450, drums are transported by road to either other company sites or directly to customers.

It is claimed that wastes produced by the application process used to produce the polyester tools are collected from the atmosphere (by scrubber fans or filters), with overspray also being collected.

Wastes collected from scrubber fans are disposed of by first crosslinking the polymer using peroxide catalyst and cobalt promoter to produce an inert plastic which is then disposed of to secure landfills. It is expected that there is very little possibility that the polymer will be able to reach waterways. Approximately 225 kg of such waste is expected (based on an estimate of 3% loss from overspray, splashes etc).

Overall, as a result of both manufacturing and use of the polymer, approximately 400 kg will be disposed of to landfills.

. Fate

The polymer is not expected to break down under normal environmental conditions, either chemically or by microbial action. The expected low solubility should prevent the polymer either leaching from landfills or dispersing in waterways, and any spills into waterways should result in the polymer settling out onto sediments.

Incineration of the polymer is expected to produce carbon monoxide and/or carbon dioxide. Toxic vapours may also form, depending on the conditions of pyrolysis, however, their composition is not known.

Wastes placed in landfills are expected to have been treated with peroxide catalysts (initiator) and cobalt promoters, and are expected to be of high molecular weight and very low solubility. Wastes resulting from either manufacturing or tool making plants is therefore not expected to move from landfill sites where it is deposited.

The high molecular weight and low water solubility suggest that tho polymer will not easily cross biological membranes, and therefore, bioaccumulation of the polymer is not likely.

9. EVALUATION OF TOXICOLOGICAL DATA

Under the Industrial Chemicals (Notification and Assessment) Act, 1989, toxicity data are not required for polymers of number-average molecular weight (NAMW) > 1000.

10. ASSESSMENT OF ENVIRONMENTAL EFFECTS

No ecotoxicological data were supplied, which is acceptable under the Act. Given the claimed low solubility and high molecular weight the polymer is not expected to display ecotoxicological properties.

11. ASSESSMENT OF ENVIRONMENTAL HAZARD

The polymer appears to be unlikely to present a hazard to the environment at any stage of its use. Relatively small amount are to be manufactured with wastes of less than 0.5 tonnes expected. Therefore, environmental exposure should be relatively low.

All wastes are to be placed in landfill sites, either pre-cured, or as discarded articles (again in a cured state). The predicted low solubility and high molecular weight should ensure that leaching does not occur. Adsorbent materials used to soak up accidental spills will also be landfilled. Should spills into water occur, the polymer is likely to sink to the sediment and not disperse to the water column

Overall, the predicted environmental hazard is low.

12. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY EFFECTS

The notified polymer has a NAMW > 1000 and should not, therefore, be able to cross biological membranes and cause adverse health effects. The levels of residual monomers also are unlikely to render the polymer hazardous (1). There is a relatively high level of low molecular weight (NAMW < 1000) species (17.7%) which may be able to cross biological membranes and cause adverse health effects. However, the polymer is manufactured for use as an 81% solution in styrene which renders the solution hazardous by virtue of the its potential adverse health effects. Control measures used to minimise exposure to styrene during manufacture and use of the notified polymer will also minimise exposure to the low molecular weight species.

Exposure to the notified polymer during manufacture is of very limited duration and is expected to be minimal as a result of the use of a closed system and local exhaust ventilation.

Formulation of the mixed resin system requires engineering controls to prevent exposure to styrene. These controls will also serve to minimise exposure to the notified polymer. Transport of the mixed resin solution to users will be in rigid steel drums and exposure is expected to occur only in the event of an accident.

The risk of adverse occupational and public health effects during manufacture, use, transport and storage of the notified polymer are expected to be minimal.

13. RECOMMENDATIONS

To minimise occupational exposure to Polymer in Polylite 44-342 the following guidelines and precautions should be observed:

. if engineering controls and work practices are insufficient to reduce exposure to a safe level, then personal protective devices which conform to and are used in accordance with Australian Standards (AS) for eye protection (AS 1336, AS 1337) (2,3), impermeable gloves (AS 2161) (4) should be worn. Protective overalls and shoes also should be worn;

. good personal hygeine should be practised;

. work practices should be implemented to avoid spills which should be cleaned up promptly and disposed of in accordance with the recommendations contained in the MSDS;

. a copy of the Material Safety Data Sheet (MSDS) should be easily accessible to employees.

14. MATERIAL SAFETY DATA SHEET

The attached Material Safety Data Sheets for Polymer in Polylite 44-342 and Polylite 44-342 were provided in Worksafe Australia format (5).

These MSDS were provided by A C Hatrick Pty Ltd as part of their notification statement. The accuracy of this information remains the responsibility of A C Hatrick Pty Ltd.

15. REQUIREMENTS FOR SECONDARY NOTIFICATION

Under the Industrial Chemicals (Notification and Assessment) Act 1989, secondary notification of Polymer in Polylite 44-342 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. National Occupational Health and Safety Commission, Approved Criteria for Classifying Hazardous Substances [NOHSC:1008], AGPS, Canberra, 1994.

2. Australian Standard 1336-1982, Recommended Practices for Eye Protection in the Industrial Environment, Standards Association of Australia Publ., Sydney, 1982.

3. Australian Standard 1337-1984, Eye Protectors for Industrial Applications, Standards Association of Australia Publ., Sydney, 1984.

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

5. National Occupational Health and Safety Commission, Guidance Note for the Completion of a Material Safety Data Sheet, 2nd. edition, AGPS, Canberra, 1990.