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NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME

FULL PUBLIC REPORT

Polyester CXR-P-114

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For Enquiries please contact the Administration Coordinator at:

Street Address: 92 Parramatta Rd Camperdown, NSW 2050, AUSTRALIA
Postal Address: GPO Box 58, Sydney 2001, AUSTRALIA
Telephone: (61) (02) 565-9466 **FAX (61) (02) 565-9465**

Director
Chemicals Notification and Assessment

FULL PUBLIC REPORT

Polyester CXR-P-114

1. APPLICANT

Huntsman Chemical Company Australia Limited of Somerville Road, West Footscray, Victoria 3012, has submitted a limited notification for the assessment of Polyester CXR-P-114.

2. IDENTITY OF THE CHEMICAL

Polyester CXR-P-114 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 have been exempted from publication in the Full Public Report and the Summary Report.

Trade name: Aropol CXR-P-114 Polyester Resin Solution is a solution of the notified polymer - Polyester CXR-P-114 - in 31% w/w styrene

Number-average molecular weight: 1776

Maximum percentage of low molecular weight species (molecular weight < 1000): NAMW Fraction < 1000 = 13%
NAMW Fraction < 500 = 5%

Method of detection and determination:

The notified polymer may be identified by Proton NMR Spectroscopy

Spectral data:

A Proton NMR spectrum was provided which was consistent with structure.

3. PHYSICAL AND CHEMICAL PROPERTIES

The notified polymer does not exist in isolated form. The following data refer to the polyester resin solution Aropol CXR-P-114 (containing 31% styrene as solvent), except where indicated.

Appearance at 20°C and 101.3 kPa: clear, pinkish yellow, viscous liquid

Boiling Point: 145°C - styrene; the resin solution is expected to undergo polymerisation on heating which would preclude measurement of the boiling point

Specific Gravity/Density: 1110 kg/m^3 at 25°C (resin solution)

Vapour Pressure: 0.5998 kPa at 25°C (styrene)

Water Solubility:	expected to be low on the basis of chemical structure
Flash Point:	31°C (Tag closed cup) - resin solution
Flammability Limits:	1.1-6.1% by volume in air (styrene)
Autoignition Temperature:	not applicable as the resin solution polymerises when subjected to heat
Explosive Properties:	there are no known explosive properties for the polyester the polyester resin solution may polymerise rapidly in the presence of contaminants and this may result in rupturing of closed containers.
Reactivity/Stability:	the polyester will polymerise in the presence of styrene solvent.
Particle size distribution:	not applicable as polyester is manufactured as a solution in styrene
Combustion Products:	carbon dioxide and carbon monoxide (polyester)

Comments on physio-chemical data:

Melting point and boiling point data could not be provided as the polyester cannot be isolated as a solid and the polyester resin solution polymerises upon heating.

Hydrolysis as a function of pH was not provided on the grounds that the crosslinked polymer (in absence of solvent) is stable to acidic and alkaline conditions likely under environmental conditions (pH 4-9). While the polymer contains a number of ester linkages, hydrolysis under environmental conditions would be precluded by low solubility.

The partition-coefficient is not applicable for this type of compound because of the lack of water solubility and the expected full miscibility in n-octanol of the polyester/styrene resin solution. The notifier states that this is confirmed by testing resins of this type in their laboratories.

Data were not provided for adsorption/desorption. Due to the low solubility of the notified chemical, in the absence of the solvent, it would solidify and be associated with the soil or sediment compartment and be unlikely to be mobile.

4. PURITY OF THE CHEMICAL

Degree of purity :	100%
Toxic or hazardous impurity/impurities:	none known
Non-hazardous impurity/impurities:	none known
Maximum content of residual monomers:	none

Additives/Adjuvants:

There are no additives or adjuvants in the notified polymer itself. The resin solution to be imported contains the following components in addition to the polymer:

Chemical name	CAS No.	Weight percentage
Major		
Styrene*	100-42-5	31
Minor		
Methyl methacrylate	80-62-6	<1
Methanone, (2-hydroxy-4-methoxyphenyl-	131-57-7	0.2
Polyoxyethylene sorbitan monolaurate	9005-64-5	0.1

* Solvent

5. INDUSTRIAL USE

The polyester resin solution Aropol CXR-P-114 is designed for use in the formulation of compounds for thermosetting plastic products for the building industry, such as kitchen bench tops.

6. OCCUPATIONAL EXPOSURE

It is estimated that 100-1000 tonnes of polymer will be manufactured per annum.

The potential for occupational exposure may exist during manufacture, distribution or use.

A total of 14 workers will be involved in the manufacture of the notified chemical. The polyester will be manufactured in an enclosed reactor, from which it will be gravity fed to a drop tank and mixed with styrene solvent and polymerisation inhibitors. Occupational exposure during the polymerisation reaction and blending process should be minimal as the operators control these processes from a separate control room and the drop tank is vented to the atmosphere.

The product, Aropol CXR-P-114, will be pumped from a drop tank (through metal pipes) to a base resin tank for storage or to a blend tank. The resin solution will be drummed from the blend tank into 200 L drums for transport to end users throughout Australia. Bulk tankers will be used instead of 200 L drums for large volume users. The greatest potential for worker exposure during manufacture will exist during the drumming process. Approximately 3 workers will manually insert lances into bottom of four storage drums and later remove them after the drums are filled. The duration of exposure, however, will be short. In addition, local exhaust ventilation will be used so that exposure to the polymer should be minimal.

Approximatley 10 workers will be involved in transporting the product to the end-users. Exposure of these workers will result only in the event of accidental spills or leaks.

The end-users will mix Aropol CXR-P-114 with fillers (eg. powdered aluminium oxide trihydrate) and liquid organic peroxide curing agent. The catalysed resin compound is then poured or pumped into casting moulds and allowed to cure under controlled temperature conditions (typically 20-30°C).

After curing, the castings are sanded using automated equipment fitted with local exhaust ventilation and bag dust collectors.

7. PUBLIC EXPOSURE

Public exposure during manufacture of the notified polymer and as a result of waste disposal is expected to be negligible.

The public may come into contact with the notified polymer when plastic material such as bench tops are utilised. However, as the notified polymer undergoes crosslinking to form a hard, durable composite, with relatively inert properties, public exposure should be minimal.

8. ENVIRONMENTAL EXPOSURE

. Release

Release of the notified polymer during the formulation stage is not likely to occur. The polyester forms from the reaction of monomers within a totally enclosed reactor, at the conclusion of which the material is immediately added to the styrene to form a solution. The drop tank is vented via a high level vent to the atmosphere. Only styrene is likely to be released from the drop tank vent. The reactor is fitted with dump tanks and collection devices as a safety measure and these tanks also are utilised to collect any spills. The precautions taken to minimise spillage and gas release during manufacture and storage are aimed at the control of any environmental release and comply with the Victorian EPA requirements for this type of manufacturing plant.

The main environmental release of the polymer is likely to occur via disposal of inert plastic waste to landfill after immobilisation by controlled polymerisation of the waste resin solution or compound. The polyester resin will also enter the environment when the fabricated product is disposed to landfill at the end of its useful life.

The installation of dust filtration on exhaust ventilation where sanding is performed should prevent release of dust from the premises into the environment.

. Fate

Spillages at the manufacturing site are either recycled or disposed of in an approved incinerator.

Empty resin drums can be recycled after cleaning or destroyed by crushing and buried at a landfill site. Waste residues in emptied drums should be incinerated in an approved incinerator at the drum recycling plant. Resin sent to landfill is in a hardened form as the open drums allow the entry of air and light which initiate the cross linking and hardening of the polymer.

The plastic article into which the notified polyester is made, is required to remain durable at ambient temperatures in a humid environment. Therefore, it is unlikely to biodegrade readily under landfill conditions.

9. EVALUATION OF TOXICOLOGICAL DATA

No toxicological data were provided for the notified polymer, which is acceptable for a synthetic polymer with number-average molecular weight (NAMW) > 1000 under the *Industrial Chemicals (Notification and Assessment) Act 1989*.

10. ASSESSMENT OF ENVIRONMENTAL EFFECTS

No ecotoxicological data were provided, which is acceptable for polymers of NAMW > 1000 according to the *Act.*

The notified polymer is unlikely to cross biological membranes due to its high molecular weight. It contains no known hazardous impurities, but does contain approximately 13% low molecular weight (NAMW < 1000) species. Analysis shows that most, if not all the constituents are > 211 Dalton MW, indicating no significant monomeric content of the polymer. The notified polymer is not likely to exhibit toxic characteristics in the environment because large polymers of this nature are not readily absorbed by biota.

11. ASSESSMENT OF ENVIRONMENTAL HAZARD

It is noted that a significant fraction of the polymer has a molecular weight below 1000, and therefore may be bioavailable. However, any hazard that this may present would be transient as the resin becomes crosslinked (cured) during evaporation of the solvent.

The notified polymer as a component of the resin will be disposed to landfill in the cured form and is not expected to biodegrade or leach.

The main environmental hazard would arise through spillage in transport accidents that may release quantities of the uncured polymer to drains and waterways. However, the polymer would quickly become immobile on association with soil/sediment layer.

The low environmental exposure of the polymer as a result of the proposed use, together with its expected low environmental toxicity, indicate the overall environmental hazard should be negligible.

12. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY EFFECTS

The notified polymer has a NAMW > 1000 and is therefore unlikely to cross biological membranes and cause adverse health effects. The GPC data for molecular weight determination suggest that there are low levels of residual monomers present in the notified polymer. However, there is a significant fraction (13%) of low molecular weight oligomers of unknown toxicity.

The notified polymer is added to a hazardous solvent (styrene) following manufacture to a final concentration of 69%. Prior to addition to the solvent, manufacture of the polymer takes place in a closed system to prevent worker exposure to the monomer constituents. Thus, exposure to the polymer during manufacture is unlikely. Following addition to the

solvent, precautions required to prevent exposure to styrene will also serve to prevent exposure to the polymer.

During use of the polymer solution to produce molded products such as kitchen benchtops, precautions taken to avoid exposure to styrene are expected to be employed and these precautions should minimise exposure to the polymer.

Public exposure during manufacture, transport or use of the notified polymer is expected to be minimal.

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

13. RECOMMENDATIONS

To minimise occupational exposure to the notified polymer in Aropol CXR-P-114 the following guidelines and precautions should be observed:

. if engineering controls and work practices are insufficient to significantly reduce exposure to a safe level, then personal protective devices which conform to and are used in accordance with Australian Standards (AS) for chemical-type goggles (AS 1336, AS 1337) (1,2), impermeable gloves (AS 2161) (3) and protective overalls should be used.

. good work practices should be implemented to avoid spillages or splashings.

. any spillages should be promptly cleaned up and disposed of in accordance with Local or State regulations.

. good personal hygiene practices, such as washing of hands prior to eating food, should be observed.

. a copy of the Material Safety Data Sheet (MSDS) for Aropol CXR-P-114 should be easily accessible to workers.

14. MATERIAL SAFETY DATA SHEET

The attached MSDS for Aropol CXR-P-114 was provided in Worksafe Australia format (4). This MSDS was provided by Huntsman Chemical Company Australia Limited as part of their notification statement and is reproduced here as a matter of public record. The accuracy of this information remains the responsibility of Huntsman Chemical Company Australia Limited.

15. REQUIREMENTS FOR SECONDARY NOTIFICATION

Under the *Industrial Chemicals (Notification and Assessment) Act 1989*, secondary notification of Polyester CXR-P-114 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. Standards Australia, 1994, Australian Standard 1336-1994 'Recommended Practices for Eye Protection in the Industrial Environment', Standards Association of Australia Publ., Sydney, Australia.

2. Standards Australia, 1992, Australian Standard 1337-1992 'Eye Protectors for Industrial Applications', Standards Association of Australia Publ., Sydney, Australia.

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

4. National Occupational Health and Safety Commission, 1990. , 'Guidance Note for the Completion of a Material Safety Data Sheet', 2nd. edition, AGPS, Canberra , Australia.[1]

[1] This Guidance Note, to which an MSDS must conform in accordance with the *Act,* has been superseded by Worksafe Australia's National Code of Practice for the Preparation of Material Safety Data Sheets (March 1994) published by the Australian Government Publishing Service.