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NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME

FULL PUBLIC REPORT

POLYESTER CXR-P-113

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Director
Chemicals Notification and Assessment

FULL PUBLIC REPORT

Polyester CXR-P-113

1. APPLICANT

Huntsman Chemical Company Australia Ltd of Somerville Rd, West Footscray VIC 3012 have submitted a Limited Notification for the assessment of Polyester CXR-P-113.

2. IDENTITY OF THE CHEMICAL

Based on the nature of the chemical and the data provided Polyester CXR-P-113 is considered to be non-hazardous. Therefore, the chemical identity, spectral data, composition, impurities, molecular weight and import volumes have been exempted from publication in the Full Public Report and the Summary Report.

Trade names: Aropol CXR-P-113 polyester resin solution

Method of detection and determination:

A 1H NMR spectrum was provided with characteristic peaks

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-113 which contains approximately 64% w/w of the notified polymer and 36% w/w styrene monomer and other minor additives.

Appearance at 20°C and 101.3 kPa:	resin solution is clear, brownish and viscous.
Melting Point:	not available.
Boiling Point:	cannot be measured due to polymerisation of resin solution on heating.
Specific Gravity:	not available for polymer. 1144 g/L at 25°C for resin solution.
Vapour Pressure:	unknown for polymer; 4.5 mm Hg at 25°C for styrene component.
Water Solubility:	unknown for polymer. Resin solution is predicted to have very low solubility.
Partition Co-efficient (n-octanol/water) log $P_{o/w}$:	not applicable to this type of compound due to lack of water solubility and the expected full miscibility in n-octanol of the polyester styrene solution.
Hydrolysis as a function of pH:	not applicable as the polyester is not isolated and is converted to crosslinked polymer composites during fabrication which are stable to acidic and alkaline conditions likely to be encountered in use and in the environment (pH 4 - 9).

Adsorption/Desorption:	it is likely that the material will remain strongly associated with soil or sediment compartments as any spills or accidental releases will polymerise in the presence of (ultraviolet) light and as the styrene component evaporates.
Dissociation Constant:	not applicable to the new polymer.
Flash Point:	not known. 33°C for resin solution.
Flammability Limits:	not known. 1.1 - 6.1 % by volume in air for styrene component of resin solution.
Combustion Products:	carbon monoxide, carbon dioxide. Combustion of the polyester resin also includes styrene and acrid smoke.
Decomposition Temperature:	Above 60°C polymerisation may begin to occur.
Decomposition Products:	leaching of constituents may occur if the cured product is exposed to concentrated hydrochloric acid or solvents such as xylene.
Autoignition Temperature:	not known for new polymer or resin solution.
Explosive Properties:	no known explosive properties. Resin solution is classified as a Dangerous Good due to styrene (Class 3 Packaging Group III). Will polymerise rapidly in the presence of heat and will thus generate heat. This may result in the violent rupture of containers.
Reactivity/Stability:	the polymer is unsaturated and is not highly reactive in the absence of styrene. the resin solution contains polymerisation inhibitors to prevent unwanted polymerisation during transport and storage. However, it will polymerise uncontrollably if exposed to polymerisation initiators or substances which remove inhibitors. These include alkalis, glycols, ultraviolet radiation, oxidising agents, strong acids, ferrous salts, metal halides or hydrogen halides.
Particle size distribution:	not applicable as the polymer is manufactured in the presence of styrene to formk a solution.

4. PURITY OF THE CHEMICAL

Degree of purity of Polyester CXR-P-113: ~ 100%

Impurities: None

Additives: No additives or adjuvants are part of the notified chemical. The notified polymer does not exist in isolated form, but is manufactured in a styrene solution.

. **Chemical name:** Styrene monomer
Synonym: Benzene, ethenyl-
CAS No.: 100-42-5
Weight percentage: ~36 %

5. INDUSTRIAL USE

The polymer will be manufactured as the the trade product known as Aropol CXR-P-113 polyester resin solution. Aropol CXR-P-113 will be used in the formulation of filler compounds for metal, woods and fibreglass articles in commercial and domestic situations. This formulated product will be added to an organic peroxide polymerisation initiator and applied with a spatula to the surface of the material where it will be allowed to cure under ambient conditions. During this process the notified polymer will become crosslinked and bound to the substrate as a matrix exhibiting the intended final function as a rigid and durable plastic.

6. OCCUPATIONAL EXPOSURE

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

Polyester CXR-P-113 is manufactured as a 64% by wt solution in styrene monomer. The polyester will be manufactured in a fully enclosed reactor. After the reaction is complete the polyester will immediately be gravity fed to a drop tank and mixed with styrene monomer as the solvent, and polymerisation inhibitors. Occupational exposure during the polymerisation reaction and blending process is not expected to occur as the operators control these processes from a separate control room and the drop tank is vented to the atmosphere. The total condenser and the vacuum pump used in the manufacturing process are vented to the process incinerator.

The polyester resin solution (Polyester CXR-P-113 plus styrene) will be pumped from the drop tank to a base resin tank for storage. The resin solution will be drummed from the tank into 200 L drums for transport to the customers' sites. Bulk tankers will be used instead of 200 L drums for large volume users. Formulation is performed at the customers site and involves the addition of fillers to the polyester resin in a mixing vessel fitted with a stirrer. The product is pumped into 5 L and 20 L containers for industrial end users and 0.5 L containers for domestic end users.

The greatest potential for worker exposure during manufacture will exist during drumming of the polyester resin. Workers will manually insert lances into the bottom of four storage drums and later remove them after the drums are filled. The duration of exposure will be short and local exhaust ventilation and personal protective equipment will be used to minimise exposure to the polymer.

Other workers will be involved in transporting the product to the end-users and will experience exposure only in the event of accidental spills or leaks.

Various control measures will be in place to maintain airborne concentrations of styrene vapour below the Worksafe Australia exposure standard (1), and workers will be instructed to wear appropriate personal protective equipment to prevent skin and eye contact. Exposure of end users may also occur to dust (Worksafe Australia exposure standard 10 mg/m^3) during sanding of the filled substrate unless preventative measures such as local exhaust ventilation are used.

7. PUBLIC EXPOSURE

There should be little risk of public exposure during manufacture and transport. The public may be exposed to the notified polymer during preparation of the filler compound in the domestic situation.

However, the prescribed labelling requirement for the containers of styrene based resin compounds and organic peroxides marketed to domestic users should provide adequate information to enable the safe use of the small quantities of the filler system involved.

Additional public exposure with the notified chemical may occur when filled articles are encountered. However, as the notified polymer undergoes crosslinking to form a hard durable composite with relatively inert properties, public exposure should be minimal.

Public exposure as a result of the described disposal methods is expected to be negligible.

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 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 notified polymer is likely to occur via disposal of inert plastic waste to landfill after immobilisation by controlled polymerisation of waste resin solution or by solidification of unused resin compound on ageing in the case of domestic use. The polyester resin will also enter the environment when the filled article is disposed to landfill at the end of its useful life.

The installation of dust filtration on exhaust ventilation equipment in areas 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.

At the fabrication sites the method of disposal of floor sweepings and trimmings is to landfill. The resin in this case is in a hardened and inert form.

Empty resin drums can be recycled after cleaning or destroyed by crushing and burial 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 and inert form as the open drums allow the entry of air and light which initiate the cross linking and hardening of the polymer.

The filler compounds (containing the polyester resin) used in metal, wood and fibreglass articles are expected to have a long life and eventually be disposed of to landfill. The plastic filler into which the notified polymer is made, is required to remain durable at temperatures of up to 60 $^{\circ}$C or in prolonged contact with water. Therefore, it is unlikely to biodegrade readily under landfill conditions.

9. EVALUATION OF TOXICOLOGICAL DATA

No toxicity 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 *Industrial Chemicals (Notification and Assessment) Act 1989*.

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 19% low molecular weight (NAMW < 1000) species. Analysis shows that most, if not all the constituents are > 220 Dalton MW, indicating no significant monomeric content of the polyester. 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 styrene 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 Polyester CXR-P-113 has a NAMW of > 1000, but contains 19% of low molecular weight (NAMW < 1000) species. There are no residual monomers. As a result of the high molecular weight it is unlikely that the polymer will cross biological membranes. No toxicity tests have been performed for Polyester CXR-P-113.

The polyester resin solution contains 36% w/w styrene, a hazardous ingredient (2). Engineering controls and personal protective equipment used to minimise exposure to the known hazards of styrene will result in minimal exposure to the notified polymer.

Based on the provided information and intended usage, Polyester CXR-P-113 does not appear to represent a significant hazard to worker or public health.

13. RECOMMENDATIONS

To minimise occupational exposure to Polyester CXR-P-113 the following guidelines and precautions should be observed:

. if engineering controls are insufficient to reduce exposure to a safe level during resin manufacture or use, the following personal protection equipment should be worn :

  - respiratory protection conforming to AS 1715 (3) and AS 1716 (4);
  - goggles conforming to AS 1336 (5) and AS 1337 (6);

- chemically resistant gloves conforming to AS 2161 (7); and
- protective overalls.

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

. any spillages should be promptly cleaned up and disposed according to local or state regulations.

. good personal hygiene should be practised.

. a copy of the Material Safety Data Sheet (MSDS) for Aropol CXR-P-113 and other products containing the notified polymer should be easily accessible to workers.

14. MATERIAL SAFETY DATA SHEET

The attached MSDS for Aropol CXR-P-113 was provided in Worksafe Australia format (8).

This MSDS was provided by Huntsman Chemical Company Australia 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 Huntsman Chemical Company Australia Ltd.

15. REQUIREMENTS FOR SECONDARY NOTIFICATION

Under the *Industrial Chemicals (Notification and Assessment) Act 1989*, secondary notification of Polyester CXR-P-113 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 1991, *Exposure Standards for Atmospheric Contaminants in the Occupational Environment*, Australian Government Publishing Service, Canberra.

2. National Occupational Health and Safety Commission 1994, *List of Designated Hazardous Substances* [NOHSC:10005(1994)] Australian Government Publishing Service, Canberra.

3. Standards Australia 1991, *Australian Standard 1715 - 1991 Selection, use and maintenance of Respiratory Protective Devices*, Standards Association of Australia Publ., Sydney.

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

5. Standards Australia 1982, *Australian Standard 1336-1982 Eye protection in the Industrial Environment*, Standard Association of Australia Publ., Sydney.

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

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

8. National Occupational Health and Safety Commission 1994, *National Code of Practice for the Preparation of Material Safety Data Sheets,* [NOHSC:2011(1994) Australian Government Publishing Service, Canberra.