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**NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION  
AND ASSESSMENT SCHEME**

**FULL PUBLIC REPORT**

**Polymer in AROPOL CXR-P-110**

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.

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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**FULL PUBLIC REPORT****Polymer in AROPOL CXR-P-110****1. APPLICANT**

Huntsman Chemical Company Australia Ltd, Somerville Rd, West Footscray Vic 3012.

**2. IDENTITY OF THE CHEMICAL**

Based on the nature of the chemical and the data provided, the polymer in AROPOL CXR-P-110, is considered to be non-hazardous. Therefore, the chemical name, CAS number, molecular formula, structural formula, molecular weight, spectral data and monomer composition have been exempted from publication in the Full Public Report and the Summary Report.

**Trade names:** AROPOL CXR-P-110 Polyester Resin Solution MSDS Code G

**Maximum percentage of low molecular weight species (molecular weight < 1000):** ~27

**Method of detection and determination:** The notified polymer may be identified by  $^1\text{H}$  NMR.

**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-110 (containing 25-55% styrene as solvent), except where indicated.

**Appearance at 20°C and 101.3 kPa:** bluish green, cloudy liquid with thixotropic flow properties (ie gel becomes liquid upon agitation)

<b>Specific Gravity:</b>	1058 kg/m <sup>3</sup>
<b>Vapour Pressure:</b>	0.6 kPa at 25°C (styrene)
<b>Water Solubility:</b>	<0.1 g/L at 25°C or 100°C (polyester component)  <0.3 g/L at 20°C (styrene)
<b>Flash Point:</b>	33°C (Tag Closed Cup)
<b>Flammability Limits:</b>	1.1-6.1% by volume in air (styrene)
<b>Autoignition Temperature:</b>	not applicable as the resin solution polymerises when subjected to heat
<b>Explosive Properties:</b>	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
<b>Reactivity/Stability:</b>	the polyester will polymerise in the presence of styrene solvent exposure of the cured polymer to concentrated hydrochloric acid or solvents may result in leaching of constituent monomers, additives or impurities
<b>Combustion products:</b>	carbon monoxide and carbon dioxide (polyester)

**Comments on physico-chemical data:**

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

Hydrolysis as a function of pH was not provided on the grounds that the crosslinked polymer (in the absence of solvent) is stable to acidic and alkaline conditions likely under environmental conditions (pH 4-9). Although the compound contains hydrolysable groups, any 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 company 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 compound, in the absence of the solvent, the compound would solidify and be associated with the soil or sediment compartment and therefore not be likely to be mobile.

#### **4. PURITY OF THE CHEMICAL**

The notified polymer contains no impurities at levels necessary to classify it as a hazardous chemical (1). Therefore, information on the purity of the polymer has been exempted from publication in the Full Public Report and the Summary Report.

##### **Major Additive:**

<b>Chemical name:</b>	Styrene
<b>Function:</b>	Solvent
<b>CAS No.:</b>	100-42-5
<b>Weight percentage:</b>	25-55

#### **5. INDUSTRIAL USE**

The polymer will be manufactured at one site in Victoria, Australia. It will be manufactured as a 45-75% component of the polyester resin solution AROPOL CXR-P-110. The resin solution will be used in the formulation of a backing compound for filled plastic composites.

The polymer will be manufactured at a rate of >1 tonne per annum.

## 6. OCCUPATIONAL EXPOSURE

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

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-110, 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 the end-users. The greatest potential for worker exposure during manufacture will exist during the drumming process. 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, however, will be short. The notifier claims that adequate local exhaust ventilation and personal protective equipment will be used so that exposure to the polymer should be minimal.

Exposure of transport workers will result only in the event of accidental spills or leaks.

The end-users will mix AROPOL CXR-P-110 with fillers and/or glass reinforcement fibre as well as a curing agent. The wet mixture will be sprayed onto a mould by chopper and rolled using hand operated rollers. The agent will be cured at room temperature. Various control measures will be in place to maintain airborne concentrations of styrene vapour below the Worksafe Australia exposure standard (2), and workers will be instructed to wear appropriate personal protective equipment to prevent skin and eye contact.

Once the agent has cured, the waste material will be trimmed and the finished article packaged and transported to storage or point of sale. Worker exposure to dust during edge trimming should be minimal as the process will be carried out under exhaust ventilation.

## **7. PUBLIC EXPOSURE**

Due to the presence of styrene (25-55% w/v) in AROPOL CXR-P-110 the solution will be handled in accordance with Australian, State and Territory regulations for flammable and polymerisable liquids, and therefore, the potential for public exposure to the notified polymer during its storage and distribution is expected to be minimal.

As the notified polymer will be manufactured in an enclosed reactor and any gaseous emissions during the process will be combusted by a process incinerator, public exposure to the notified polymer is not expected to occur during its production.

Spray equipment used to apply AROPOL CXR-P-110 is designed to produce "coarse" resin solution droplets and to minimise airborne mist and wastage through overspray (estimated to be 1-2% of the resin solution used). Any overspray is expected to be absorbed by an inert adsorbent (eg. sand, earth or vermiculite) spread over the floor of the spray area. While some dust may be generated during trimming procedures, dust filtration systems should prevent release of dust from the factory. Public exposure to the notified polymer during its industrial use is not expected to be significant.

Disposal of any waste notified polymer will be by incineration or to landfill. Empty containers will be cleaned, reconditioned or destroyed and will not be discarded directly to landfill. In case of spills, AROPOL CXR-P-110 will be contained and adsorbed with inert adsorbents and sealed in containers for disposal.

Public exposure to the notified polymer resulting from use of the end-products is not expected to occur as once the resin cures, a rigid crosslinked polymer is produced.

## **8. ENVIRONMENTAL EXPOSURE**

### **. Release**

The production plant is a totally enclosed reactor where solid raw materials are added utilising exhaust ventilation and liquid raw materials are added via piping systems under controlled conditions, with exhaust process gases being led to and consumed in the site incinerator. 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.

Release at the site of fabrication of the finished article containing the polyester resin is expected to be low. In fibreglass product fabrication facilities the mixing and application of the components containing the notified product is at the mould. An estimated 1-2% of the notified product may be released as overspray. The overspray and any spillages of the resin are collected on sand spread on the factory floor to facilitate the daily cleanup. The sand resin mixture is disposed of to landfill.

Trimming of the edges of the moulds of the cured resin fibreglass mix is carried out under exhaust air conditions, with dust and trimmings collected for disposal.

#### . **Fate**

Spillages at the manufacturing site are either recycled or disposed of in an approved off site 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. The 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 fabricated products are expected to have a long life and eventually be disposed of to landfill. Hydrolysis or biodegradation of the cured ester is expected to be minimal 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*.

## **11. ASSESSMENT OF ENVIRONMENTAL HAZARD**

It is noted that a significant fraction of the polymer (.27%) has a molecular weight below 1000, and therefore may be bioavailable in the environment. However, any hazard that this may present would be transient as the resin becomes crosslinked (cured) after evaporation of the solvent.

In the cured form the notified product is inert and not expected to biodegrade or accumulate in the environment.

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.

## **12. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY EFFECTS**

The notified polymer in AROPOL CXR-P-110 has a NAMW > 1000, however, the polymer contains a relatively large proportion (.27%) of low molecular weight (<1000) species which may cross biological membranes.

The formulated product contains hazardous ingredients (including 45% styrene solvent). Engineering controls and personal protective equipment used to minimise exposure to these hazardous ingredients, will result in minimal exposure to the notified polymer.



Under normal use conditions the polymer should not pose a significant health risk to workers or the public.

### **13. RECOMMENDATIONS**

To minimise occupational exposure to the notified polymer in AROPOL CXR-P-110 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 clothing conforming to AS 3765.1 (8) or AS 3765.2 (9).
- . 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 practices, such as washing of hands prior to eating food, should be observed.
- . A copy of the Material Safety Data sheet for AROPOL CXR-P-110 and other products containing the notified polymer should be easily accessible to workers.

### **14. MATERIAL SAFETY DATA SHEET**

The Material Safety Data Sheet (MSDS) for AROPOL CXR-P-110 (Attachment 1) was provided in Worksafe Australia format (10). The 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 the new polymer in AROPOL CXR-P-110 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, *Guidance Note for Determining and Classifying a Hazardous Substance*, Australian Government Publishing Service Publ., Canberra, 1991.
2. National Occupational Health and Safety Commission, *Exposure Standards for Atmospheric Contaminants in the Occupational Environment*, 2nd Edition, Australian Government Publishing Service Publ., Canberra, 1991.
3. Australian Standard 1715- 1991 *Selection, use and maintenance of Respiratory Protective Devices*, Standards Association of Australia Publ., Sydney, 1991.
4. Australian Standard 1716-1991 *Respiratory Protective Devices*, Standards Association of Australia Publ., Sydney, 1991.
5. Australian Standard 1336-1982 *Eye protection in the Industrial Environment*, Standard Association of Australia Publ., Sydney, 1982.
6. Australian Standard 1337-1984 *Eye Protectors for Industrial Applications*, Standards Association of Australia Publ., Sydney, 1984.

7. Australian Standard 2161-1978 *Industrial Safety Gloves and Mittens (excluding Electrical and Medical Gloves)*, Standards Association of Australia Publ., Sydney, 1978.
8. 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.
9. 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.
10. National Occupational Health and Safety Commission, *Guidance Note for Completion of a Material Safety Data Sheet*, 3rd Edition, Australian Government Publishing Service Publ., Canberra, 1991.