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**NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION  
AND ASSESSMENT SCHEME**

**FULL PUBLIC REPORT**

**Polyester Alkyd 04**

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**Director  
Chemicals Notification and Assessment**

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**FULL PUBLIC REPORT****Polyester Alkyd 04****1. APPLICANT**

Nuplex Industries (Aust) Pty Ltd of 49-61 Stephen Road Botany NSW (ACN 25 000 045 572) has submitted a notification statement in support of their application for an assessment certificate for the synthetic polymer of low concern (PLC), Polyester Alkyd 04.

**2. IDENTITY OF THE CHEMICAL**

The chemical name, CAS number, molecular and structural formulae, molecular weight, spectral data, details of the polymer composition and details of manufacturing sites have been exempted from publication in the Full Public Report.

**Marketing names:** Polyester Alkyd 04

**3. POLYMER COMPOSITION AND PURITY**

Details of the polymer composition have been exempted from publication in the Full Public Report.

**4. PLC JUSTIFICATION**

The notified polymer meets the PLC criteria.

**5. PHYSICAL AND CHEMICAL PROPERTIES**

The following physical and chemical properties are for the notified polymer, unless otherwise stated.

<b>Property</b>	<b>Result</b>	<b>Comments</b>
<b>Appearance</b>	Pale yellow solid	
<b>Boiling point</b>	145°C	Commercial form of the notified polymer.

<b>Density</b>	1278 kg/m <sup>3</sup> at 25°C	
<b>Water solubility</b>	Not determined	The notifier indicates that the notified polymer is expected to have negligible water solubility based on its predominantly hydrophobic character.
<b>Particle size</b>	Not determined	The notified polymer is produced as a solution in styrene.
<b>Vapour Pressure</b>	0.6 kPa at 20°C	Commercial form of the notified polymer.
<b>Flammability</b>	Not flammable	
<b>Autoignition temperature</b>	> 300°C	
<b>Flash Point:</b>	31°C	Commercial form of the notified polymer.
<b>Explosive properties</b>	Not explosive	None
<b>Stability/reactivity</b>	Not determined	The notified polymer is stable.
<b>Hydrolysis as function of pH</b>	Not determined	The notified polymer contains ester linkages that could be expected to undergo hydrolysis under extreme pH conditions. However, in the environmental pH range of 4 to 9, significant hydrolysis is unlikely to occur due to its low water solubility.
<b>Partition coefficient</b>	Not determined	The partition coefficient has not been determined due to its low water solubility, and its likely hydrophobic nature, which is indicative of partitioning into the octanol phase.
<b>Adsorption/desorption</b>	Not determined	The notified polymer is expected to be relatively immobile in soil due to its low water solubility.
<b>Dissociation constant</b>	Not determined	The notified polymer contains no functional groups that may be expected to gain or lose a proton

## 6. USE, VOLUME AND FORMULATION

### Use:

The notified polymer is a component of resin binders used in the manufacture of chemically resistant composite articles, such as underground tanks and pipes.

**Manufacture/Import volume:**

The notified polymer will be manufactured at up to two sites in Australia. Less than 2000 tonnes per annum of the notified polymer will be manufactured in each of the first five years. The notified polymer will be blended to form a commercial product, which will be distributed Australia wide and overseas.

**Formulation details:**

The raw ingredients are weighed into a closed reaction vessel and heated until the required specification levels are reached. The polymer is then stripped of process solvent, diluted with styrene and filtered. Additions of other ingredients to the commercial form of the notified polymer would also be made at this stage and packed into containers (bulk road and rail containers, 1000 L Hazacons, 205 L metal drums, 23 kg metal pails and 0.5, 1, 2, and 4 kg metal tins) for distribution to consumer sites throughout Australia.

At the end user site, the product containing the notified polymer is mixed with an organic peroxide catalyst, and sprayed along with glass filament on to moulds. The resin-glass mixture is rolled to remove trapped air and cured at either ambient or elevated temperatures. The manufactured items include chemically resistant composite articles such as underground tanks and pipes.

The concentration of the notified polymer in its commercial form and in end use products will be less than 60 %.

At the end of a campaign of synthesis of the notified polymer, the reaction vessel will be used to synthesise another polymer without cleaning prior to use. During maintenance, the reaction vessel may be cleaned with solvent and the washings are added to the product.

**7. OCCUPATIONAL EXPOSURE**

Exposure route	Exposure details	Controls indicated by notifier
<b><i>Manufacture of resin intermediate</i></b>		
<i>Plant operator (20 workers per site, 1 1/2 hours/day, maximum of 4 days/year)</i>		
Dermal, and ocular	<p>Skin contamination, and eye exposure are possible when weighing and adding raw materials into reaction vessel and when thinning the commercial form of the notified polymer.</p> <p>Limited exposure to spills and leaks during equipment maintenance, filtering and packing of the end use product containing the notified polymer, and if</p>	<p>Manufacturing process is carried out in an enclosed scaled reactor with a closed circuit towards the automated filling machine.</p> <p>Filtration process is mostly sealed and local exhaust ventilation extraction system is in place.</p> <p>Personal protective equipment (PPE) includes protective clothing, eye protection and impermeable gloves.</p>

containers are overfilled.

Limited dermal exposure	Skin contact when collecting and handling small quantities of the commercial form of the notified polymer and end use products containing the notified polymer for laboratory analysis	None specified; however, laboratory staffs are expected to wear laboratory coats, gloves and eye protection.
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***End use***

*Fibreglass fabricators (3 workers per site, 8 hours/day)*

Dermal, ocular and inhalation	Skin contact when mixing end use products containing the notified polymer with catalyst.  Dermal and inhalation exposure when spraying end use products with glass filament to obtain a composite article.	Spray application is automated and the spray room is fitted with fume extraction system and down draft ventilation.  PPE: overalls, goggles, solvent resistant gloves and respiratory protection.
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***Transport and storage***

None anticipated	Exposure is expected only in the event of an accident.	None
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## **8. PUBLIC EXPOSURE**

While there may be potential for public exposure to products manufactured using the fibre reinforced composite materials incorporating the notified polymer, there is unlikely to be any direct contact with the notified polymer. Once the fibre-resin has cured, the notified polymer is bound within the solid resin and not bioavailable. Also, the notified polymer is unlikely to be biologically active due to its high molecular weight.

## **9. ENVIRONMENTAL EXPOSURE**

### **9.1. Release**

The notifier indicates that the amount of waste generated from the manufacture of the notified polymer is expected to be negligible as a result of the synthesis being carried out in committed equipment and the recycling of reactor washings into subsequent resin batches. Similarly, release during the manufacture is expected to be low because the fibreglass products are moulded and all waste from spraying will be contained within the plant and waste resulting from off cuts will be minimal. Therefore, it is expected that up to 0.1% or <2 tonnes per annum of wastes containing the notified polymer will be disposed of during manufacture and use, and up to 0.05% or <1 tonne per annum of the notified polymer will be released during the disposal of containers.

## 9.2. Fate

The majority of the notified polymer will be reacted with styrene to form a very high molecular weight and stable polymer matrix. Therefore, once incorporated into fibreglass, the notified polymer is expected to be immobile and pose little risk to the environment.

Small amount of wasted notified polymer from spills, equipment cleaning and the manufacture of fibreglass products will be collected and disposed of to landfill. Liquid wastes resulting from the cleaning of application equipment used in the manufacture of fibreglass products will either be incinerated or evaporated to dryness. The resulting solid residue will be disposed of to landfill. Incineration of wastes containing the notified polymer will result in the production of water vapour and oxides of carbon.

The notified polymer is not expected to be water-soluble; therefore, will not be mobile in either the terrestrial or aquatic compartments. As a consequence of its low water solubility, the notified polymer is expected to associate with the soil matrix and sediments, and slowly degrade through abiotic and biotic processes to water vapour and oxides of carbon. The notified polymer is not expected to cross biological membranes due to its high molecular weight and low water solubility, and is therefore not expected to bioaccumulate (Connell, 1990).

## 10. EVALUATION OF HEALTH EFFECTS DATA

No toxicological data were submitted.

The health hazards of the additives and adjuvants are tabulated below.

<b>Chemical</b>	<b>Health hazards</b>	<b>Regulatory controls</b>
<b>Additives/adjuvants</b> The notified polymer is produced as a solution in styrene.	Styrene possesses narcotic-like properties. Excessive exposure may result in headache, dizziness, incoordination, fatigue, nausea, loss of appetite and loss of consciousness. Harmful by inhalation and irritating to eyes and skin. Styrene is classified as "possibly carcinogenic to human" by the International Agency for Research on Cancer (IARC).	Hazardous substance  R20; R36/38; Xn ≥2.5% (NOHSC, 1999a)  NOHSC Exposure Standard: time weighted average (TWA); 50 ppm; short term exposure limit (STEL) 100 ppm (NOHSC, 1995)

## **11. EVALUATION OF ENVIRONMENTAL EFFECTS DATA**

No ecotoxicological data were submitted.

## **12. ENVIRONMENTAL RISK ASSESSMENT**

The majority of the notified polymer will be reacted to form a very high molecular weight and stable polymer matrix and, as such, is expected to be immobile and pose little risk to the environment.

Wastes containing the notified polymer from spills, equipment cleaning and the manufacture of fibreglass products will be collected and disposed of to landfill. Liquid wastes resulting from the cleaning of application equipment used in the manufacture of fibreglass products will either be incinerated or evaporated to dryness and the resulting solid residue disposed of to landfill. Incineration of wastes containing the notified polymer will result in the production of water vapour and oxides of carbon.

The notified polymer is expected to have low water solubility and, as a result, will be immobile in both terrestrial and aquatic compartments. As a consequence, the notified polymer is expected to associate with the soil matrix and sediments, and slowly degrade through abiotic and biotic processes to water vapour and oxides of carbon. The notified polymer is not expected to cross biological membranes due to its high molecular weight and low water solubility, and is therefore not expected to bioaccumulate.

The notified polymer is not likely to present a risk to the environment when it is stored, transported and used in the proposed manner.

## **13. HEALTH AND SAFETY RISK ASSESSMENT**

### **13.1. Hazard assessment**

No toxicological information has been provided for the notified polymer. The notified polymer contains low concentrations of residual monomers and has high molecular weight, therefore, absorption across biological membranes and resultant systemic toxicity would be limited. The polymer meets the PLC criteria and is unlikely to be a hazardous substance according to the NOHSC *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 1999b).

The polymer is produced as a solution in styrene and is never isolated. Because of the presence of styrene, the notifier classified the commercial products containing the notified polymer as a hazardous substance with risk phrases: Harmful by inhalation (R20) and Irritating to eyes and skin (R36/38) (NOHSC, 1999b). It is a dangerous good, Class 3, flammable liquid (ADG, 2001).

There is a NOHSC exposure standard for styrene of 50 ppm (TWA) and 100 ppm (STEL).



The MSDS for the commercial form of the notified polymer indicates the following potential health effects: May result in irritation, vomiting and depression. May cause severe eye and skin irritation. Prolonged contact with skin may cause blistering and repeated contact may have defatting effect causing skin dryness and cracking. Vapour can cause severe irritation to the respiratory tract. These potential health effects relate to styrene present in the commercial product rather than the notified polymer.

### **13.2. Occupational health and safety**

The resin manufacturing process is performed in a closed vessel with a closed circuit to filling off. Dermal and ocular exposure may occur during weighing and addition of raw materials to reaction vessel. Intermittent dermal exposure to spills if containers are overfilled, sampling for laboratory analysis and during maintenance of equipment is also possible. To prevent off-site contamination, spillage is contained in bunded areas. During the above activities, workers wear protective clothing, eye protection and impermeable gloves. Local exhaust ventilation extraction system is in place at the entire manufacturing site.

Dermal, ocular and inhalation exposure may also occur during application of the commercial products containing the notified polymer with fibreglass components. Spray application is automated and the spray room is fitted with fume extraction system and down draft ventilation. Workers will wear overalls, goggles and solvent resistant gloves. The MSDS for the commercial form of the notified polymer also recommends that safety boots should be worn and to use respiratory protection when the air concentrations exceed the recommended exposure limits.

It is the responsibility of the employer to maintain environmental concentrations of styrene below the respective NOHSC exposure standard.

Given that the manufacturing and application processes are mostly sealed and automated, limited occupational exposure is expected when carrying out resin manufacture and fibreglass fabrication.

Worker exposure during transport and storage is not expected except in the event of accident.

The notified polymer is of low concern to worker health and safety, and no specific additional risk reduction measures are necessary. The commercial form of the notified polymer is hazardous and more stringent precautions will be taken to prevent worker exposure. The notifier states that well-established measures are in place to minimise styrene exposure including, use of adequate ventilation systems to maintain exposure to levels below the relevant occupational exposure standards. The largely enclosed and automated equipment and the use of personal protective equipment when handling the commercial form of the notified polymer and the end use products containing the notified polymer, would ensure that the occupational risk posed by the notified polymer is low when used as specified in the notification.

### **13.3. Public health**

The notified polymer is a component of a product used in the manufacture of fibre reinforced composite materials. The commercial form of the notified polymer is not available for sale to the public. There will be significant public exposure to the notified polymer in the form of finished fibre reinforced composite materials. In this form, the notified polymer is bound within the cured solid material and not bioavailable. There is unlikely to be any public health risk posed by the notified polymer.

## **14. MSDS AND LABEL ASSESSMENT**

### **14.1. MSDS**

The MSDS of the commercial form of the notified polymer provided by the notifier was in accordance with the NOHSC *National Code of Practice for the Preparation of Material Safety Data Sheets* (NOHSC, 1994a). It is published here as part of the assessment report. The accuracy of the information on the MSDS remains the responsibility of the applicant.

### **14.2. Label**

The label for the commercial form of the notified polymer provided by the notifier was in accordance with the NOHSC *National Code of Practice for the Labelling of Workplace Substances* (NOHSC, 1994b). The accuracy of the information on the label remains the responsibility of the applicant.

## **15. RECOMMENDATIONS**

### *Control Measures*

#### Occupational Health and Safety

- Employers should implement the following engineering controls to minimise occupational exposure to the commercial form of the notified polymer and end use products containing the notified polymer:
  - Exhaust ventilation during the entire manufacturing process
  - Enclosed and automated resin manufacture, packaging process and resin composite material fabrication
  - Enclosed and automated spray application of products containing resin solution
- Employers should implement the following safe work practices to minimise occupational exposure when handling the commercial form of the notified polymer and end use products containing the notified polymer:
  - Avoid spills and leaks during transfer operations, packaging of resin solution and maintenance of equipment
  - Spray application should be conducted in a down draft spray booth.

- Employers should ensure that the following personal protective equipment is used by workers to minimise occupational exposure to the commercial form of the notified polymer and end use products containing the notified polymer:
  - Chemical resistant gloves
  - Protective clothing which protects the body, arms and legs
  - Eye protection such as goggles or faceshield
  - Respiratory protection during spray application

Guidance in selection of personal protective equipment can be obtained from Australian, Australian/New Zealand or other approved standards.

- A copy of the MSDS should be easily accessible to employees.
- If products and mixtures containing the notified polymer are classified as hazardous to health in accordance with the NOHSC *Approved Criteria for Classifying Hazardous Substances*, workplace practices and control procedures consistent with provisions of State and Territory hazardous substances legislation must be in operation.

#### Emergency procedures

- In the event of a spill, the notified polymer should be contained and absorbed on inert material (soil or earth) and the resulting waste disposed of to landfill.

### 15.1 Secondary notification

The Director of Chemicals Notification and Assessment must be notified in writing within 28 days by the notifier, other importer or manufacturer:

- (1) Under Section 64(1) of the Act; if
  - the notified polymer is introduced in a chemical form that does not meet the PLC criteria.

or

- (2) Under Section 64(2) of the Act:
  - if any of the circumstances listed in the subsection arise.

The Director will then decide whether secondary notification is required.

## 16. REFERENCES

Federal Office of Road and Safety, Australian Code for the Transport of Dangerous Goods by Road and Rail (2001), Australian Dangerous Goods Code, 6<sup>th</sup> Edition, Australian Government Publishing Service, Canberra.

Connell D. W. (1990) General characteristics of organic compounds which exhibit bioaccumulation. In Connell D. W., (Ed) Bioaccumulation of Xenobiotic Compounds. CRC Press, Boca Raton, USA.

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

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National Occupational Health and Safety Commission (1995) Adopted National Exposure Standards for Atmospheric Contaminants in the Occupational Environment, [NOHSC:1003(1995)]. In: Exposure Standards for Atmospheric Contaminants in the Occupational Environment: Guidance Note and National Exposure Standards. Australian Government Publishing Service, Canberra.

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