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NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION
AND ASSESSMENT SCHEME

FULL PUBLIC REPORT

POLYESTER Z 905

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For Enquiries please contact Ms Mai Le 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 Z 905

1. MANUFACTURER

Ashland Pacific Pty Ltd, Sir Thomas Mitchell Rd, Chester Hill, NSW, 2162.

2. IDENTITY OF THE CHEMICAL

Trade Name: Polyester Z 905

Marketing Name: Polyester Coil Coating

Molecular Weight: The number average molecular weight was demonstrated to be >2000 by reference to an appropriate standard. Approximately 2% of the sample was found to have a number average molecular weight less than 2000. A negligible proportion of the sample had a number average molecular weight less than 1000.

Polyester Z 905 is classified as a non-hazardous chemical to humans because polymers with a molecular weight of >1000 are unlikely to be able to cross bioligical membranes. For this reason, the chemical name, Chemical Abstract Registry Number (CAS No.:) and the molecular and structural formulae have been exempted from publication.

3. PHYSICAL AND CHEMICAL PROPERTIES

At room temperature and atmospheric pressure, the polymer in Polyester Z 905 is a light amber coloured soft toffee like mass with a mild ester odour. Polyester Z 905 is manufactured as a solution in xylene and as such is a viscous amber coloured liquid.

Specific gravity: 1,100 kg/m^3 (30% xylene solution)

Hydrolysis as a function of pH: Undetectable

Thermal decomposition products: water vapour and oxides of carbon

Reactivity: not reactive

Comments on Physico-Chemical Properties

Data on Flash point, Flammabilty limits, Autoignition temperature and Explosive properties are not required for a polymer of this type.

Attempts were made to test the polyester's solubility by UV/VIS spectrophotometry. While this method appears to be relatively insensitive the literature supports that polyesters of this type are highly insoluble and difficult to hydrolyse.

No data were provided for partition coeffient, adsorption/desorption and dissociation constant. The high molecular weight of the polymer is likely to prevent it from crossing biological membranes and the partition coefficient test would be difficult to perform and interpret. The molecular weight of the polymer and its expected insolubility suggests the polymer is likely to be immobile in soil. Again measurement and interpretation of a result for this property would be difficult due to the complexity of this substance. The polyester, due to its nature, is unlikely to dissociate.

4. METHOD OF DETECTION AND DETERMINATION

Infrared spectroscopy is used to detect the polymer in Polyester Z 905

5. PURITY OF THE CHEMICAL

Degree of purity of polymer: 100% w/w

Amount of polymer in Polyester Z 905: 70%

Low molecular weight polymer: There is a negligible amount of polymer with a number average molecular weight <1000

6. INDUSTRIAL USE

Polyester Z 905 is used as a binder in steel and aluminium coil coating applications.

7. OCCUPATIONAL EXPOSURE

Polyester Z 905 will be manufactured in Australia from the constituent monomers and transported in 200 litre drums to a paint manufacturer. The paint is then transported to a coil coating factory where it is applied to metal by a roller-coater and cured in a hot air convection oven.

During manufacture of Polyester Z 905 exposure to the polymer may occur during sampling from the reaction vessel while testing reaction progress, during transfer of the batch into a batch tank for dissolution in solvent, during mixing of same and during drumming off into 200 litre drums. Due to the potential for exposure to constituent monomers and solvent, engineering controls would be required to minimise exposure to vapours. These controls would also minimise exposure to the polymer.

At the paint manufacturing plant, exposure to the polymer may occur during transfer of Polyester Z 905 to a mixing vessel, during mixing and drumming off into 200 litre drums. Engineering controls would be required to minimise exposure to solvents. These controls would also minimise exposure to the polymer.

At the coil coating plant, much of the process appears to be automated and is enclosed to minimise exposure to vapours produced during curing. This containment would minimise exposure to the polymer.

8. PUBLIC EXPOSURE

As the polymer is a non-volatile resin with a molecular weight >2000 the potential for harm to humans is considered to be low.

During preparation of the polymer solution, paint preparation and coil coating, exposure to the polymer should be low due to engineering controls and enclosed processes.

Public exposure to the polymer after application is limited due to the polymer/xylene solution's low water solubility and hydrolytic stability.

There is no risk of public exposure from domestic applications as the material is notified for use in industrial applications only.

9. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY EFFECTS

The polymer component of Polyester Z 905 has a high molecular weight (>2000) and is therefore considered unlikely to be absorbed across biological membranes such as the skin, gastrointestinal tract or respiratory system.

There is no toxicity data on the polymer itself. Any toxicity data on the polymer solution in xylene would be confounded by the presence of solvent. However, since xylene is added to the enclosed reactor vessel immediately after polymerisation, the polymer component of Polyester Z 905 is never found in pure form. It is expected that methods used for containment of the highly volatile and flammable xylene component of Polyester Z 905 will also serve to minimise exposure to the polymer component.

Residual monomers are present at <0.1% and thus there is no potential hazard from this source.

Although no data were provided on thermal stability of the polymer, during coil coating residence time in the oven is short, the whole process is enclosed, and the solvent vapours and gases from coating and curing processes are discharged to the atmosphere via an incinerator as water vapour and oxides of carbon.

Due to extremely low public exposure under normal use conditions, it is unlikely that Polyester Z 905 will pose any serious health or safety hazard to the public.

10. ENVIRONMENTAL EXPOSURE

Release

Polyester Z905 will be manufactured by adding the ingredients to a sealed reactor and raising the temperature to achieve polymerisation. Xylene is added to form a polymer solution which is "drummed off" in 200 L containers and transported to the paint manufacturing site for paint formulation.

The notifier states that vapours from the xylene polymer solution are ducted to a thermal oxidiser where they are combusted to

carbon monoxide, carbon dioxide and water vapour and released to the atmosphere. Aqueous distillate containing organic compounds are collected and sent to a waste management authority aqueous waste disposal facility. The notifier states that all waste polymer from "out of specification" product is expected to be reworked and diverted for use in other areas such as fence paint or foundry sand binder.

Although the notifier does not envisage the likelihood of waste landfill, it is stated that removal and disposal would be conducted under Waste Management Authority approval. An estimated 100 kg (0.1% of 100 tonnes) of material would be disposed of annually if disposal was considered an option.The waste would be dried (xylene reused), submitted for leachate analysis and, dependent on waste toxicity, landfilled at an approved site.

The polymer solution is despatched to a paint manufacturing plant where it is mixed with a cross linking resin, pigments and aromatic solvents to form the surface coating paint.

Solvent vapours from the mixing process are discharged to the atmosphere from exhaust ventilation systems on the processing equipment. The company states that solvent waste is recovered by redistillation and "off specification" product is reworked in subsequent formulation batches or diverted to less demanding applications and would not be disposed of.

Paints containing the polymer are despatched to a coil coating plant where the surface coating is applied to coils of steel and aluminium sheet by a continuous process. This process involves chemical treatment of the uncoiled metal, priming, finish coating, curing and recoiling of the metal. The finish coating process uses a reverse roller coater which leads to negligible loss of paint during application. The only paint loss appears to be the small amount left over at the bottom of the 200 L paint drum which is estimated to be less than 0.1%.

Solvent vapours and gases from the coil coating and curing processes are discharged to the atmosphere via an incinerator as water vapour and oxides of carbon.

The substance will further polymerise during the curing/drying process and drying of the residue at the bottom of the 200 L paint drum to a higher molecular weight polymer.

Fate

The notifier states that by nature of the application, the polymer is required to be stable under a wide range of conditions. The polymer will form water vapour and oxides of carbon on combustion. As the substance is a fully saturated polyester in combination with other materials to form a coating resistant to weather and environmental conditions, biodegradation is expected to be an extremely slow process. The expected biodegradation products are hydrogen and oxides of carbon.

11. ASSESSMENT OF ENVIRONMENTAL EFFECTS

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

The notified substance is not expected to exhibit toxic characteristics because large polymers of this nature are not readily absorbed by biota.

12. ASSESSMENT OF ENVIRONMENTAL HAZARD

The polymer is unlikely to present a hazard to the environment when it is incorporated into the paint and applied to the aluminium and steel coils in the factory, since little is released.

The polymer is also unlikely to present a hazard to aquatic organisms due to the end-use applications on aluminium and steel coils and the polymer's high molecular weight.

The notifier does not forsee the likelihood of landfill disposal of waste polymer as any off-grade polymer would be diverted for use in other areas.

13. RECOMMENDATIONS FOR SAFETY PROCEDURES TO CONTROL OCCUPATIONAL EXPOSURE AND OCCUPATIONAL HAZARDS

Because polyester Z 905 is always dissolved in a solvent, precautions for spill and leakage, storage etc. appropriate to that solvent should be observed including:

. the workplace should be well ventilated and enclosed systems fitted with local exhaust ventilation should be used in polymer and paint mixing and handling operations;

. good work practices should be followed to avoid spillages or splashings;

. good housekeeping and maintenance are essential. Empty drums or cans should be removed to a safe place whilst awaiting disposal. Disposal should be in accordance with local regulations. Should there be an accidental spillage or leakage, make sure sources of ignition are absent and ventilate the area affected; for small quantities, absorb onto paper towels and evaporate the solvents in a fume hood, larger quantities should be collected and atomised in a suitable combustion chamber. Full personal protection should be worn in the event of a spillage or leakage.

. sources of ignition should be eliminated from work areas. Devices should be constructed of non-sparking material. All electrical equipment should meet the requirements of AS 3000 - *Electrical Installations - Buildings, Structures and Premises* (1), and conductive articles should be electrically grounded;

. a copy of MSDS for the polymer and paints should be easily accessible to employees.

The recommendations outlined in the MSDS for Polyester Z 905 with regard to Precautions for Use and Safe Handling Information should be followed.

14. RECOMMENDATIONS FOR MATERIAL SAFETY DATA SHEET (MSDS)

The MSDS for Polyester Z 905 and for the paint Polyester Autumn Red have been compiled in accordance with Worksafe Australia format (2) and are provided as Attachments 1 and 2. The information and recommended control measures contained in these MSDS generally reflect the hazards associated with the use of Polyester Z 905. The accuracy of this information remains the responsibility of Ashland Pacific Pty Ltd.

15. REQUIREMENTS FOR SECONDARY NOTIFICATION

Under the Industrial Chemicals (Notification and Assessment) Act 1989 (the Act), secondary notification of Polyester Z 905 by Ashland Pacific Pty Ltd shall be required if any of the circumstances stipulated under section 64(2) of the Act arise.

16. REFERENCES

1. Australian Standard 3000-1986 *Electrical Installations - Buildings, Structures and Premises*, Standards Association of Australia Publ., Sydney, 1986

2. National Occupational Health and Safety Commission *Guidance Note for the Completion of a Material Safety Data Sheet*, 2nd Edition, Australian Government Publishing Service Publ., Canberra, 1990.