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**NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION  
AND ASSESSMENT SCHEME**

**FULL PUBLIC REPORT**

**EM-521 POLYMER**

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 Health, Housing, Local Government and Community Services.

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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Director  
Chemicals Notification and Assessment

**FULL PUBLIC REPORT****EM-521 POLYMER****1. APPLICANT**

Taubmans Pty Ltd, 51 McIntyre Rd, Sunshine, Victoria.

**2. IDENTITY OF THE CHEMICAL**

EM-521 polymer 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 and spectral data, have been exempted from publication in the Full Public Report and the Summary Report.

**Trade name:** EM-521 polymer (EM-521 polymer is the main component of "Intermediate EM-521", an emulsion which is a component of another emulsion)

**Number-average molecular weight:** 2800

**Maximum percentage of low molecular weight species (molecular weight < 1000):** 14%

**Method of detection and determination:**

Infra-red spectroscopy

**3. PHYSICAL AND CHEMICAL PROPERTIES**

**Appearance at 20°C and 101.3 kPa:** very viscous, clear, amber liquid

**Density:** 1050 kg/m<sup>3</sup>

**Decomposition Temperature:** stable up to temperatures of 120-150°C

**Reactivity/Stability:** incompatible with strong mineral acids, strong alkalis and strong oxidising agents

**Comments on physico-chemical properties****• Water Solubility**

Water solubility data were not provided. By analogy with similar polymers, it is not expected to be soluble in water as water insolubility is a functional requirement. However, the polymer emulsion is fully miscible with water.

- **Hydrolysis**

Significant hydrolysis is not expected under environmental relevant conditions due to its water insolubility.

- **Partition Co-efficient**

The partition co-efficient was not provided on the grounds that the polymer is not expected to cross biological membranes due to its high molecular weight.

- **Adsorption/desorption**

Adsorption/desorption data were not provided. Upon drying the polymer polymerises to form an insoluble clear solid that would immobilise it.

- **Dissociation constant**

There are readily dissociable groups in the polymer, however due to the high molecular weight and expected low water solubility the dissociation constant would be hard to measure.

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

**Degree of purity:** >99%

**Toxic or hazardous impurities:** None expected

**Non-hazardous impurities (> 1% by weight):** None

**Maximum content of residual monomers:** All monomers expected to be below their detection limits

**Additives/Adjuvants:** None

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

EM-521 polymer is a resin adduct used as a component of an industrial coating. It will be manufactured at a rate of > 1 tonne per year for the next five years.

The notified chemical has been produced and used overseas for approximately 9 years.

#### **6. OCCUPATIONAL EXPOSURE**

For manufacture of the notified polymer each of the monomers is charged from drums to a closed reactor vessel. As the reaction continues samples are taken for analysis. During manufacture of EM-521 polymer, another resin solution is added for quenching. Following completion of the reaction, the resin solution is added to a tank containing water, surfactant and lactic acid forming the emulsion "Intermediate EM-521". The resin dispersion is > 20% (w/w)

of EM-521 polymer. The dispersion is discharged from the tank, through a filter bag to drums for storage.

When required, this material is blended with two resin solutions, water and other additives to produce the final emulsion containing < 20%(w/w) EM-521 polymer. The emulsion is stored in bulk prior to transport by bulk tanker to the customer.

A maximum of 61 workers are involved in EM-521 polymer manufacture. The duration of exposure is expected to be a maximum of 8 days per year at up to 8 hours/day for all but storage personnel where exposure to the finished product is expected to be 20 days/year at up to 2 hours/day.

Manufacture is performed in a fixed area of the notifier's factory and local exhaust ventilation is used for sampling, laboratory testing, bulk filling and drum filling.

The user will transfer the emulsion into bulk storage tanks. When required, the emulsion will be pumped to a tank and mixed with paint for application onto the substrate, resulting in a final product with a EM-521 polymer content of < 10%. This surface coating mixture is applied to the substrate by dipping prior to curing in an oven.

Of the 31 workers involved in application of the coating, the 2 maintenance personnel may be exposed for 1-2 hours per day, 14 days per year and the 5 laboratory staff (quality control and troubleshooting) may be exposed for about 1 hour per day, 210 days per year in total.

## **7. PUBLIC EXPOSURE**

There is low potential for public exposure to the notified polymer during manufacturing operations, which are conducted in enclosed equipment within bunded or sealed locations. Off-specification batches would be disposed of by incineration at a licensed facility, while small spills and waste residues (estimated to be 50 kg/month) will be consigned to landfill. The polymer is non-volatile. Given that the expected frequency of transport is only 1-2 loads/month, the probability of public exposure arising from a transport accident is also low. Although there will be widespread public contact with the articles painted with the notified polymer, it will be cured and sealed under other layers of paint. Under these conditions, absorption of the notified polymer should not occur.

## **8. ENVIRONMENTAL EXPOSURE**

### **. Release**

EM-521 polymer is to be manufactured in Australia at Taubmans Sunshine (Vic.) in a closed reaction vessel. An intermediate resin is formed, then diluted with Urethane ND4642B (a solution with propylene glycol monomethyl ether) and then polyoxypropylenediamine is added. To this mixture is added water plus additives to form an emulsion, Intermediate EM-521. All waste water, spills etc. from the processing area are treated (interceptors pits) prior to discharge to

the sewer as trade waste. The interceptor pits should trap most of the polymer. The emulsion Intermediate EM-521 is then be mixed with Urethane ND4642B and another resin. This emulsion is stored in bulk before it is transported to the customer. The emulsion contains < 10% of the polymer. All the storage areas are completely sealed and bunded, with all spills etc. treated as for the waste from the processing area.

The customer will mix the polymer emulsion with paint for application onto the substrate. When required, the polymer emulsion will be pumped to a holding tank, mixed with paint before application to the substrate, giving a final concentration of < 10%. The application to the substrate has a high level of efficiency. The notifier claims that efficiencies of up to 98% paint usage are achieved. Waste from the process is to be flocculated with alkali, then neutralised before discharge to the sewer. The solids that settle out are disposed of according to Victorian State Environmental Legislation by landfill. After coating, the coated articles are baked to cure the polymer.

Apart from accidents during transport, the possible release of uncured polymer to the environment is negligible. The cured polymer will be further coated with paint etc. before release to the environment.

#### . **Fate**

The ultimate fate of the majority of the polymer EM-521 is landfill. The small amount of waste polymer generated in the manufacturing process, estimated at 50 kg per month, will be disposed of by landfill. Any rejected batches, estimated at 1 per 2000 batches, will be disposed of by incineration. As the polymer has expected low water solubility leaching from landfill sites is not anticipated. Incineration of the notified substance is expected to produce water, and oxides of carbon and nitrogen.

Waste containing the polymer generated in the coating of articles is to be treated by flocculation, with the solids being disposed of by landfill.

The cured polymer on the coated articles will be disposed of with the articles. The current practice is to dispose of coated articles at the end of their useful life by landfill.

### **9. ASSESSMENT OF ENVIRONMENTAL EFFECTS**

No ecotoxicity data were provided, but none are required according to the Act, since the notified polymer has a number average molecular weight (NAMW) > 1000.

Due to its high NAMW the polymer is not expected to cross biological membranes.

### **10. ASSESSMENT OF ENVIRONMENTAL HAZARD**

The polymer is unlikely to present a hazard to the environment at any stage of its use. Of the original quantity of polymer emulsion

manufactured (<100 tonnes) it is expected that most will not be released from the production/application site until it has been cured. The ultimate fate of all cured polymer is not known but most likely the majority will be disposed of by landfill. Leaching of the cured polymer from landfill is not expected due to the chemical and physical bonding which occurs during the surface coating process.

Waste generated by manufacture of the polymer (<50 kg per month) will be disposed of by landfill. Any liquid wastes or spills generated during manufacture, formulation or storage is to be treated by passage through interceptor pits, with the waste water to be discharged to the sewer as trade waste. The notifier states that the interceptor pits would trap most of the polymer. The waste generated from coating the articles will be collected and treated by flocculation before discharge to the sewer as trade waste. The flocculation should remove almost all of the polymer. In the event that a small amount of the notified polymer is released to the sewer, it will be further treated at the municipal sewage treatment works before discharge to the aquatic environment. At the treatment works most of the polymer should be contained in the sludge, which will be incinerated or sent to landfill. Therefore the potential for release to the aquatic compartment is minimal and the associated environmental hazard negligible.

Accidents that occur during transport of the polymer will be treated according to the MSDS sheets for the final emulsion which will serve to minimise any environmental contamination.

The low level environmental exposure of the polymer as a result of normal use, together with its expected lack of biological activity, indicate that the overall environmental hazard should be negligible.

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

As the notified chemical is a polymer of high number average molecular weight (> 1000), it is not expected to be able to cross biological membranes and should not be considered a health hazard for this reason. Undetectable levels of residual monomers also make it unlikely that the notified polymer will present a health hazard.

There is a relatively high level (14%) of species with a molecular weight < 1000 of unknown toxicity. However, it is expected that any toxic effects would be dependent on leaching of the low molecular weight species from the polymer.

Exposure of manufacturing personnel is largely controlled by sealed systems and local exhaust ventilation and is limited to a maximum of about 8 days per year, 8 hours per day.

The customer for the notified chemical receives it as a water emulsion containing < 10% EM-521 polymer and exposure is limited to a maximum of about 1 hour per day, 210 days per year.

It is expected that the risk of adverse health effects from exposure to the polymer during manufacture is low given the containment procedures in use. At the customer's site the risk of adverse health effects from exposure to the polymer may also be considered low because it is now at a low percentage in the final product and the coating process is of high efficiency process with little waste.

Under normal conditions, there is low potential for public exposure to the notified polymer during manufacture, transport and application. Although widespread public contact will occur with coated articles treated with the notified polymer, absorption should not occur because the material will be cured and sealed under other layers of paint. The use pattern outlined by the notifier and the relatively low hazard associated with the notified polymer suggests that it does not pose a significant public or occupational health risk.

## **12. RECOMMENDATIONS**

To minimise occupational exposure to EM-521 polymer the following guidelines and precautions should be observed:

- . if engineering controls and work practices are insufficient to reduce exposure to EM-521 polymer to a safe level, then personal protective devices which conform to and are used in accordance with Australian Standards (AS) for eye protection (AS 1336, AS 1337) (1,2), impermeable gloves (AS 2161) (3) and protective clothing (AS 3765.1, 3765.2) (4,5) should be worn;
- . a copy of the Material Safety Data Sheet should be easily accessible to employees.

## **13. MATERIAL SAFETY DATA SHEET**

The attached Material Safety Data Sheets (MSDS) for EM-521 polymer and the applied coating were provided in Worksafe Australia format (6).

These MSDS were provided by Taubmans Pty Ltd as part of their notification statement. The accuracy of this information remains the responsibility of Taubmans Pty Ltd.

## **14. REQUIREMENTS FOR SECONDARY NOTIFICATION**

Under the *Industrial Chemicals (Notification and Assessment) Act 1989*, secondary notification of EM-521 polymer shall be required if any of the circumstances stipulated under subsection 64(2) of the Act arise. No other specific conditions are prescribed.

## 15. **REFERENCES**

1. Australian Standard 1336-1982, *Recommended Practices for Eye Protection in the Industrial Environment*, Standards Association of Australia Publ., Sydney, 1982.
2. Australian Standard 1337-1984, *Eye Protectors for Industrial Applications*, Standards Association of Australia Publ., Sydney, 1984.
3. Australian Standard 2161-1978, *Industrial Safety Gloves and Mittens (excluding Electrical and Medical Gloves)*, Standards Association of Australia Publ., Sydney, 1978.
4. 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.
5. 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.
6. National Occupational Health and Safety Commission, *Guidance Note for the Completion of a Material Safety Data Sheet*, 2nd. edition, AGPS, Canberra, 1990.