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**NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION
AND ASSESSMENT SCHEME**

FULL PUBLIC REPORT

M-488 Polyester Resin

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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Director
Chemicals Notification and Assessment

FULL PUBLIC REPORT**M488 Polyester Resin****1. APPLICANT**

Paint Industries (Aust) Pty Ltd of 1-19 Bennett Street, Mortlake NSW 2173 , has submitted a limited notification for the assessment of M-488 polyester resin.

2. IDENTITY OF THE CHEMICAL

Based on the nature of the chemical and the data provided, M-488 polyester resin is considered to be non-hazardous. Therefore, the chemical name, CAS number, molecular formula, structural formula, molecular weight, spectral data, components of the chemical and the specific use have been exempted from publication in the Full Public Report and the Summary Report.

Trade name: M-488 polyester resin

Method of detection and determination:

The notified polymer can be identified by infrared spectroscopy.

3. PHYSICAL AND CHEMICAL PROPERTIES

The majority of the data is for the notified polymer in ShellSol A solvent as the polymer is manufactured in a solution of ShellSol A from which it is never isolated.

Appearance at 20°C and 101.3 kPa:	clear, viscous, colourless liquid
Odour:	hydrocarbon odour
Boiling Point:	160°C (approximate boiling point of ShellSol A)
Density:	base polymer 1.212 kg/m ³ polymer solution 1.060kg/m ³
Vapour Pressure:	0.1866 at 20°C (for ShellSol A)
Water Solubility:	expected to be insoluble
Fat Solubility:	not provided
Partition Co-efficient (n-octanol/water) log P_{ow}:	not provided
Hydrolysis as a function of pH:	not measured

Adsorption/Desorption:	not determined
Dissociation Constant (pKa):	not determined
Flash Point:	44°C (closed cup).
Flammability Limits:	based on ShellSol A lower explosive limit: 1.0% v/v upper explosive limit: 7.5% v/v
Combustion Products:	water vapour and oxides of carbon
Pyrolysis Products:	not provided.
Decomposition Temperature:	not provided.
Decomposition Products:	not provided.
Autoignition Temperature:	450°C - based on ShellSol A
Explosive Properties:	not provided
Reactivity:	stable but should be kept from strong oxidising agents.

Comments on Physio-Chemical Properties

The boiling point was determined for ShellSol A, as the polymer will only exist in a 55.5% solution in ShellSolA.

The melting point was not supplied. This is acceptable as the substance is only present as a solution in ShellSolA.

Water solubility was not determined due to the presence of ShellSolA in the polymer solution. This is acceptable, as polyesters are known to be highly insoluble in water.

As a polyester paint resin the polymer is expected not to be water soluble, and hydrolysis, partition coefficient, adsorption/desorption and dissociation constant could not be determined.

The notified polymer contains a number of ester linkages but hydrolysis in the environmental pH range would be precluded, particularly once the polymer is cured.

4. PURITY OF THE CHEMICAL

Toxic impurities:	Chemical name:	Dibutyl tin oxide
	Synonym:	dibutylstannane oxide
	CAS No:	818-08-6
	Weight percentage:	0.1% (Poison by ingestion may result (LD ₅₀ (oral,rat): 44.9mg/kg). A skin and eye irritant (1).

5. INDUSTRIAL USE

M488 polyester resin is used in the manufacture of pigmented protective and decorative coatings for metals.

It is estimated that in the first five years the estimated volume of manufacture per annum will be approximately 600 tonnes of polymer solids produced as 1250 tonnes of resin solution.

6. OCCUPATIONAL EXPOSURE

The notified polymer will be manufactured in an enclosed heated reaction vessel. The reactant monomers will be loaded manually to a cold reactor which is sealed and heated. After melting, the esterification reaction will proceed with the elimination of water. Mid-way through the reaction the temperature is dropped to below reaction temperature and ShellSol A is added under negative pressure. The heating is re-applied and the reaction is continued to completion azeotropically, at atmospheric pressure. On completion of the reaction the acid value and viscosity of the batch is checked to gauge the progress of the polymerisation reaction.

The polymer solution will be stored in a 50,000 litre tank prior to formulation. When compounding the paint, the polymer solution will be pumped automatically from the storage tank into a high speed mixer. Pigments and solvents are added and, after mixing, the premix is pumped directly to a horizontal bead mill or a temporary bulk storage tank. After milling, the paste is extended with further quantities of polymer solution and solvents in a final assembly tank. The final paint will contain approximately 50% of M488 polyester resin solution (30% polymer solids).

A total of 14 workers will be involved in the manufacturing, storage and transport of the polymer. Of these 14 workers, 4 will be involved in batch weighing and operation of the chemical plant. There will be 4 workers involved in storage and loading, and 2 drivers involved in transporting the notified chemical. Quality control testing and supervision involve another 4 workers. Occupational exposure will be minimal for the workers involved in operation of the chemical plant as the process is fully automated.

7. PUBLIC EXPOSURE

There should be little opportunity for public exposure during manufacture and compounding of the notified polymer.

The paint coating will be sold only in bulk to industrial metal producers. Transport will be by road in 1000 L minibulkers or 200 L drums. At the customer's premises, the paint coating will be applied to metal substrates for decorative and protective purposes using a roller coating process. The product is applied in an enclosed room with a constant airflow directing vapours away from the operator. Any such vapours produced and all those emanating from the subsequent curing oven are incinerated. The product is alleged to be totally consumed in this process with no wastage. There should be negligible public exposure during application procedures.

According to Material Safety Data Sheet recommendations waste resin and minor spills during manufacture and formulation will be absorbed with inert materials and disposed of to an appropriate landfill. Any polymer disposed of in this fashion is expected to become inert as the polymer cures.

The public may come into contact with the notified polymer after it is applied to metal surfaces. However, once cured, the polymer is alleged to be stable and inert, therefore resulting in negligible exposure.

8. ENVIRONMENTAL EXPOSURE

. Release

The production process involves the mixing and reacting of the reactants and solvents in closed vessels, then storing of the polymer resin. The resin is then mixed with pigment in a closed vessel prior to filling in either 200 L drums or mini-bulker tanks.

There is potential for spillage of the polymer solution when mixing with pigment and in filling. However, spills would be contained at the plant through existing bunding and absorbed on inert material, then disposed of to landfill. Spent filter cartridges would also be disposed of to landfill. Any polymer disposed of in this fashion is expected to become inert as the polymer cures. The volume of polymer disposed of to landfill is estimated to be about 0.01% of the production volume.

The polymer, formulated as a surface coating, will be applied to metal substrates for decorative and protective purposes using a roller coating process. Information provided by the notifier indicates this process has very little, if any, wastage.

Scrapping of the end-product would be to land-fill with the cured polymer remaining inert.

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 *Act*.

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

11. ASSESSMENT OF ENVIRONMENTAL HAZARD

The polymer is being produced for a specific, industry-based, end-use as a surface coating on metal products. As such, it will be fully cured and stable. A minor release (0.01% of polymer produced or 60 kg per annum) is expected to be lost to the Australian environment through disposal of residue at landfill. Again, the residue is expected to cure and become inert. The application of the product to metal substrates involves highly sophisticated and automated processes with no wastage of product expected. Once applied, the product is cured and the end-product widely distributed. Scrapping of the end-product would be to land-fill with the cured polymer remaining inert. Therefore, it is considered that the polymer does not pose a significant hazard to the environment.

12. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY EFFECTS

The notified polymer has a NAMW > 1000 and is therefore unlikely to cross biological membranes and cause significant systemic effects. The polymer contains relatively small amounts of low molecular weight (<1000) polymeric species (5%) and residual monomers (<0.1%). However, the potential for occupational exposure should be low and therefore the notified polymer should not pose a significant health and safety risk. Measures taken to avoid exposure to the solvent ShellSol A, which is more hazardous than polymer itself, should minimise exposure to the notified polymer.

The polymer will always be present in the solvent ShellSol A. Due to the physico-chemical and toxicological hazards associated with this solvent, all users will be required to employ various control measures to minimise solvent exposure to safe levels. The engineering controls e.g. closed lines, vapour extraction system and exhaust vent incinerator which the users will have in place will greatly reduce exposure to the notified polymer itself.

There are no records of occurrence of work-related health effects attributable to the manufacture of similar polymers and raw materials among the personnel employed in the Australian operations.

While public contact with materials coated with the notified polymer may be encountered, public exposure to the notified polymer is expected to be negligible. The notifier has indicated that the new polymer will be sold only as the formulated paint product to industrial processors for application to metal. After application, the paint is cured and forms a stable and inert protective coating.

13. RECOMMENDATIONS

To minimise the occupational health risk of and environmental exposure M488 Polyester Resin the following guidelines and precautions should be observed:

- . if engineering controls and work practices are insufficient to significantly reduce exposure to a safe level, then personal protective devices which conform to and are used in accordance with Australian Standards (AS) for chemical-type goggles (AS 1336; AS 1337) (2,3), impermeable gloves (AS 2161) (4) and overalls and protective shoes.
- . good work practices should be implemented to avoid spillages or splashings.
- . disposal of waste should be in accordance with Material Safety Data Sheet (MSDS) recommendations.
- . good personal hygiene practices, such as washing of hands prior to eating food, should be observed.
- . a copy of the MSDS for M488 Polyester Resin and products containing it should be easily accessible to workers.

14. MATERIAL SAFETY DATA SHEET

The MSDS for M488 was provided in Worksafe Australia format (5).

This MSDS was provided by Paint Industries (Aust) Pty Ltd as part of their notification statement and is reproduced here as a matter of public record. The accuracy of this information remains the responsibility of Paint Industries (Aust) Pty Ltd.

15. REQUIREMENTS FOR SECONDARY NOTIFICATION

Under the *Industrial Chemicals (Notification and Assessment) Act 1989*, secondary notification of M488 Polyester Resin 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. Sax, I.N. and Lewis, R.J. Sr. *Dangerous Properties of Industrial Materials*. Van Nostrand Reinhold, New York, 1989.
2. Australian Standard 1336-1994, Eye protection in the Industrial Environment, Standard Association of Australia Publ., Sydney.
3. Australian Standard 1337-1992, Eye protectors for Industrial Applications, Standard Association of Australia Publ., Sydney.
4. Australian Standard 2161-1978, Industrial Safety Gloves and Mittens (excluding Electrical and Medical Gloves), Standard Association of Australia Publ., Sydney, 1978.
5. National Occupational Health and Safety Commission, Guidance Note for Completion of a Material Safety Data Sheet 2nd Edition, Australian Government Publishing Services, Canberra, 1990.