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NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME

FULL PUBLIC REPORT

Ftalon TN/100

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Director
Chemicals Notification and Assessment

FULL PUBLIC REPORT

Polymer in Ftalon TN/100

1. APPLICANT

Swift and Company of 64 Trenerry Crescent, ABBOTSFORD, VIC 3067 and PPG Industries Australia Pty Ltd of McNaughton Rd, CLAYTON, VIC 3169 have submitted a limited notification statement in support of their joint application for an assessment certificate for Polymer in Ftalon TN/100.

2. IDENTITY OF THE CHEMICAL

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

Trade Name:	Ftalon TN/100
Number-Average Molecular Weight (NAMW):	> 1000
Method of Detection and Determination:	The polymer is characterised by GPC and identified by IR spectroscopy. A reference spectrum has been provided.

3. PHYSICAL AND CHEMICAL PROPERTIES

The polymer is manufactured as a 65 % (w/w) solution in xylene and aromatic hydrocarbon. It is never isolated. The properties reported below are variously those of the polymer solution and of the notified polymer, as stated.

Appearance at 20°C and 101.3 kPa:	Colourless viscous solution
Boiling Point:	138°C for the solution; the polymer is not expected to be volatile
Specific Gravity:	1.04 for the solution; 1.13 (calculated) for the polymer
Vapour Pressure:	0.9 kPa at 20°C (for the polymer solution)

Water Solubility:	The notifier states that the polymer is expected to be of low water solubility (see below)
Hydrolysis as a Function of pH:	No groups are expected to be hydrolysed under normal environmental conditions
Partition Co-efficient (n-octanol/water):	Not determined (see below)
Adsorption/Desorption:	Not determined (see below)
Dissociation Constant:	Not determined (see below)
Particle Size:	Not applicable as the polymer is not isolated from solution
Flash Point:	24°C for the solution
Flammability Limits:	Upper Explosive Limit = 6.6 % Lower Explosive Limit = 1 % (for the polymer solution)
Autoignition Temperature:	450°C (for the polymer solution)
Explosive Properties:	The polymer is not expected to be explosive
Reactivity/Stability:	The polymer is expected to be stable

Comments on Physico-Chemical Properties

The notifier claims that by analogy with similar polymers, the polymer is not expected to be volatile under the conditions of use. The polymer solution is also expected to boil at the temperature of the solvent, while the vapour pressure of the polymer is predicted to be very low with the value provided being that for the solution (xylene and aromatic hydrocarbon).

The water solubility was not determined, but the notifier states that the polymer is expected to be of low solubility (< 10 mg/L) by analogy with similar polymeric structures since it is non-ionic, of high molecular weight and contains a high level of aliphatic and hydrophobic groups.

The polymer contains ester linkages that could be expected to undergo hydrolysis under extreme pH conditions. However, due to the low water solubility, this is unlikely in the environmental pH range of between 4 and 9.

The determination of partition coefficient and adsorption/desorption could not be undertaken as the notified polymer is expected to be insoluble in water and will largely partition into *n*-octanol rather than water. Due to its low water solubility, the polymer is expected to become associated with the organic component of soils and sediments.

No dissociation constant data was provided as the polymer will not contain functional groups

which would be expected to dissociate. A molar excess of alcohol functional groups was used in the production of the polymer and few free carboxylic acid groups would be expected to remain in the polymer.

The polymer would be expected to be combustible, however, the polymer solution is flammable due to the solvent content, and is classified as a Class 3 dangerous good.

4. PURITY OF THE CHEMICAL

Degree of Purity:	> 99 %; resin solution as prepared contains 65 % in xylene and aromatic hydrocarbon
Maximum Content of Residual Monomers:	All residual monomers are present at 0.1 % (or less), and all are present at below the cutoff levels for classification of the polymer as hazardous.
Toxic or Hazardous Impurities:	none

Additives/Adjuvants:

Chemical name:	xylene
CAS No.:	1330-20-7
Weight percentage:	10 - 30 % in polymer resin solution
Toxic properties:	On the *List of Designated Hazardous Substances* (National Occupational Health and Safety Commission, 1999a) R20/21 Harmful by inhalation and in contact with skin R38 Irritating to skin NOHSC exposure standard 80 ppm TWA, 150 ppm STEL Xn cutoff 12.5 %

Chemical name:	solvent naphtha, petroleum, light aromatic, hydrotreated
Synonyms:	aromatic hydrocarbon
CAS No.:	68512-78-7
Weight percentage:	< 10 % in polymer resin solution
Toxic properties:	On the *List of Designated Hazardous Substances* (National Occupational Health and Safety Commission, 1999a) T cutoff 0.1 % R45(2) 'May cause cancer' R65 'May cause lung damage if swallowed'

	the R45(2) notation does not apply if the solvent contains less than 0.1 % benzene
Chemical name:	1,2,4-trimethylbenzene
CAS No.:	95-63-6
Weight percentage:	< 10 % in polymer resin solution
Toxic properties:	On the *List of Designated Hazardous Substances* (National Occupational Health and Safety Commission, 1999a) R20 'Harmful by inhalation' R36/37/38 'Irritating to eyes, respiratory system and skin' there is a NOHSC exposure standard for trimethylbenzenes of 25 ppm TWA
Chemical name:	mesitylene
Synonyms:	1,3,5-trimethylbenzene
CAS No.:	108-67-8
Weight percentage:	< 10 % in polymer resin solution
Toxic properties:	On the *List of Designated Hazardous Substances* (National Occupational Health and Safety Commission, 1999a) R37 'Irritating to respiratory system' there is a NOHSC exposure standard for trimethylbenzenes of 25 ppm TWA

The notified polymer will initially be imported in pre-prepared paints, and will have a large number of adjuvants such as stabilisers, pigments and solvents.

5. USE, VOLUME AND FORMULATION

The notified polymer will initially be imported as a component in an automotive repair paint at up to 30 % (w/w). It will be imported at a volume of 1 - 10 tonnes of polymer in the first year. The polymer solution, Ftalon TN/100, containing 65 % (w/w) notified polymer will later be imported for local reformulation into coatings. After the first year, the import or manufacture volume is expected to be in the range of 10 – 100 tonnes per annum.

6. OCCUPATIONAL EXPOSURE

Pre-prepared paints containing the notified polymer will be imported in 3.5 L, 4 L and 20 L

tinplate cans and pails. The notifier has provided no detail on the type of packaging for the overall shipment of imported individual containers or the handling involved in breaking up the shipment into individual containers for dispatch to the customer sites. The individual product containers are not expected to be opened before arrival at the end use site and the likelihood of a spill is low.

The polymer solution, Ftalon TN/100, will be imported in 200 L steel drums. It will be transferred from the docks to a licensed dangerous goods store and then transferred by road transport to the reformulation site. Up to 4 warehouse and transport workers will be involved in handling the notified polymer.

Waterfront, transport and warehouse workers are not expected to be exposed to the notified polymer except in the case of an accident involving spillage of the paint or resin solution.

The laboratory development and reformulation into coatings will be carried out at a single site within Australia.

Laboratory Development
The notifier indicated that 3 laboratory workers would be involved in the manufacture and testing of paint. The potential exposure would be for up to 8 hours per day, for up to 20 days per year. Exposure would be by skin contact during the handling of small quantities of the polymer solution and paint. The use of appropriate laboratory ventilation facilities and personal protective equipment such as a laboratory coat and safety glasses would be expected.

Paint Manufacture
The reformulation of polymer solution into paint components, when commenced, will involve 9 workers for up to 8 hours per day, 30 days per year. Three groups of workers will be involved in the process; in paint mixing, quality control and drum or can filling. The mixers used for preparing the paint will be enclosed and fitted with local exhaust ventilation. Dermal exposure to the polymer will be possible at several points throughout the process; charging the polymer solution into the mixer, removal and testing of quality control samples, and drips and spills during the paint filtration and filling. The formation of aerosols during the high speed mixing will be unlikely because of the viscosity of the mixture.

The mixing and filling will be carried out under local exhaust ventilation to prevent exposure to the solvents. Workers will wear impervious gloves, coveralls and goggles, with additional personal protective equipment being used as required.

Paint Application
The notifier estimates that as many as 3000 spray painters in up to 3000 establishments across Australia could be exposed to the notified polymer. The exposure is estimated to be for up to 4 hours per day, on a daily basis.

The spray painters who will be exposed to the notified chemical will be fully TAFE trained. Typically the spray painter will measure the appropriate amounts of the different components required in a particular formulation into an open container and pour this mixture into a spray gun. The spraying of the automobile will be carried out in a laminar flow downdraft spray booth which is designed to rapidly remove aerosol particles and solvent vapour from the atmosphere. Several possible booth designs may be used. In a dry floor booth, the overspray

will be collected in filters contained in the floor of the booth; any unremoved particulates will reach the exhaust stack with the solvent vapours. In a wet floor booth, overspray will collect in a pool of water below the grill floor or in a wet scrubber in the exhaust and will be removed with a filter. The residual solids will be disposed of to secure landfill. The spray booths are subject to AS/NZS/4114.1:1995 *Spray Painting Booths – Design, Construction and Testing* and AS/NZS/4114.1:1995 *Spray Painting Booths – Selection, Installation and Maintenance*. After application of the paint, the automobile are heated to cure the coating.

Residual paint mixture is likely to be washed from the equipment manually, using recycled paint solvent, and the washings disposed of by solvent recyclers.

Once the final paint mixture has dried, the notified polymer will be irreversibly bound within the cured matrix and not separately available for exposure to workers.

Spray painters will wear appropriate personal protective equipment at all times; impervious gloves and anti-static flame retardant overalls while mixing the paint, and, in addition, a full face shield and respirator conforming to AS/NZS1715 and AS/1716 while inside the spray booth.

7. PUBLIC EXPOSURE

There is little potential for public exposure to the notified polymer arising from manufacture, transport, occupational use and disposal. Waste from the industrial use of the polymer will be disposed of through a licensed waste disposal contractor in approved landfill. The polymer in the form of uncured paint will therefore remain within the industrial domain, and public exposure due to the environmental spread of the polymer is unlikely.

The notified polymer will enter the public domain only in the form of cured paint films on automobiles. This paint film will contain the polymer in a crosslinked unreactive form which will not be bioavailable. Therefore, due to the high molecular weight, which will preclude absorption across the skin and other biological membranes, and the cured state of the notified polymer, exposure will be negligible.

8. ENVIRONMENTAL EXPOSURE

Release

There is the potential for spills to occur during transport, storage, manufacture and use. Generally the amount lost in this manner is expected to be minor. Spills during manufacturing will be contained by bunding.

Waste streams in the manufacturing process all go to on-site treatment (the “Dusol” process). In this process any paint or resin is dissolved and converted to an inert solid which is then disposed of to landfill. Approximately 2 % of the notified polymer will be lost during production, i.e. the amount of waste polymer generated will be 200 kg in year 1, increasing to 2 tonnes in year 5.

At user sites the biggest source of waste will be from spray painting, with approximately 70%

of the paint applied becoming overspray. The overspray will be captured within the booth or in the filters of the exhaust ventilation system. It is estimated that, in year 1, up to 7 tonnes of waste will be generated from user sites, and that over the next 4 years this will increase to a maximum of 70 tonnes. Waste will be generated from the cleaning of spray guns, mixing equipment, spray booths and filters, as well as being collected on masking materials such as kraft and newspaper. This waste will be sent to landfill after treatment by licensed waste contractors.

Some residue (an estimated 2 % of the container contents) will also remain in the 'empty' containers after use (up to 200 kg in the first year and 1000 kg annually in the subsequent years). This residue will be allowed to dry and then disposed of to landfill.

Fate

The final fate of the polymer will be the same as the coated article, ie either recycled or sent to landfill. During the recycling process, the paint (incorporating the polymer) will either be removed and become part of a solid/sludge waste that will go to landfill or incineration, or it will be destroyed in a process such as smelting. Incineration of the paint film would emit noxious fumes including oxides of carbon. Over the life of the car (averaging 20 years) there will be slow deterioration of the paint due to exposure to UV light.

The solid waste generated during manufacture (200 kg in year 1, increasing up to 2 tonnes by year 5) and application of the paint (up to 7.2 tonnes in year 1 and up to 71 tonnes by year 5) will be disposed of to landfill. Leaching of the polymer from landfill is unlikely since the majority of the polymer will be present within a cured inert paint matrix. The remainder of the polymer is likely to have an affinity for soil and therefore leaching is unlikely.

The polymer is not expected to cross biological membranes due to its high molecular weight, and therefore should not bioaccumulate (Connell, 1989).

9. EVALUATION OF TOXICOLOGICAL DATA

No toxicology data were submitted. The polymer is stable with low volatility. Polymers of high molecular weight and low water solubility do not readily cross biological membranes. The notifier states that no occupational or public health issues have been reported for polymers of similar composition in Australia.

10. ASSESSMENT OF ENVIRONMENTAL EFFECTS

No ecotoxicological data were provided.

11. ASSESSMENT OF ENVIRONMENTAL HAZARD

Once the paint is applied, the polymer will crosslink with the other paint components to form a stable paint film and consequently should not present a hazard. Any chips, flakes or fragments formed by mistreatment or general wear and tear will be inert. The paint will

slowly deteriorate due to exposure to UV light and to the elements, but this will be insignificant.

Waste generated during the manufacture and use of the paint will be disposed of to landfill, or by incineration. As indicated above, the polymer is unlikely to leach from landfill.

12. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY EFFECTS

No toxicological information has been provided for the notified polymer and therefore the substance cannot be assessed against the NOHSC *Approved Criteria for Classifying Hazardous Substances* (National Occupational Health and Safety Commission, 1999b). However, the polymer solution Ftalon TN/100 is a hazardous substance because of the concentration of xylene present. The risk phrases R10, 'Flammable', R20/21/22 'Harmful by inhalation, in contact with the skin, and if swallowed' and R37/38 'Irritating to respiratory system and skin' apply. The aromatic hydrocarbon used in this product contains less than 0.1 % benzene, and the R45(2) classification is therefore not required.

The polymer solution is scheduled under the SUSDP as a poison (S5) because of the xylene content. It is also classed as a Class 3 dangerous good (flammable liquid) because of the solvent content. The MSDS for the polymer solution Ftalon TN/100 lists a number of potential health effects, namely nausea, vomiting, headaches, dizziness, skin, eye and respiratory irritation and central nervous system depression, along with central nervous system disorders from repeated exposure. These relate to the solvents, xylene and aromatic hydrocarbon, rather than the notified polymer.

Occupational Health and Safety
There is little potential for significant occupational exposure to the notified polymer in the transport and storage of the paint components containing this polymer. There will be exposure during the local production of the paint components (when commenced), and in the use and disposal of the paints.

During the reformulation process, the main exposure route for the notified polymer will be dermal. The paints and polymer solutions will be viscous, and ready formation of aerosols is not expected. The polymer is not expected to be hazardous by dermal exposure as the high molecular weight will preclude absorption through the skin. Protective measures used to prevent exposure to the hazardous solvents should provide sufficient protection against the notified polymer.

The final paint mix, including the pre-prepared paint containing the notified polymer, could contain a wide variety of additional ingredients once fully mixed. This is likely to introduce human health hazards because, apart from a range of potentially toxic solvents, there may be components containing resins with pendant isocyanate groups. The spraying procedure also produces a dense aerosol of paint particles which would adversely affect human health even in the absence of additional hazardous components. It is also probable that professionals involved in the spray painting industry will use a number of different paint formulations.

For these reasons, the notified polymer must be assessed for the contribution it makes to the hazards associated with use of the spray paints. The presence of many potential and actual

hazardous substances in the formulations requires the use of stringent engineering controls, such as a correctly constructed and maintained spray booth, and of a high level of personal protective equipment, such as impermeable overalls and gloves and a full face shield and respirator. The use of the paint containing the notified polymer should be in accordance with the NOHSC *Draft National Code of Practice for Spray Painting* (National Occupational Health and Safety Commission, 1991). The level of protection from exposure afforded by the standard protective measures will provide adequate protection from the notified polymer, which is likely to be less intrinsically toxic than most of the solvents, pigments and other paint resins.

Once the applied final paint mix has hardened, the polymer will not be separately available for exposure or absorption.

There is a NOHSC exposure standard for xylene, identified as an ingredient in the polymer solution Ftalon TN/100. The employer is responsible for ensuring that this exposure standard, and exposure standards pertaining to other final paint mix additives, are not exceeded in the workplace.

The paint components containing the notified polymer are flammable due to their solvent content. Precautions must be taken to avoid sources of ignition, e.g. use of earthing leads. Operators should wear antistatic overalls and footwear.

Similar considerations apply in the disposal of the polymer. The wastes containing the notified polymer may be hazardous substances on the basis of the solvent and other resin content, and the precautions used on the basis of these additional materials should be adequate for protection from the notified polymer. In addition, much of the polymer will be crosslinked, hardened and immobilised by the time of disposal.

Public Health
There is negligible potential for public exposure to the notified polymer arising from use in paints. There may be public contact with the notified polymer on the painted surfaces of motor vehicles, but its adhesion to the substrate and the physico-chemical properties of the cured paint will be sufficient to preclude absorption across the skin or other biological membranes. Therefore, based on its use pattern and physico-chemical characteristics, it is considered that the notified polymer will not pose a significant hazard to public health.

13. RECOMMENDATIONS

To minimise occupational exposure to Ftalon TN/100 the following guidelines and precautions should be observed:

- Use of the paints containing the notified polymer should be in accordance with the NOHSC *Draft National Code of Practice for Spray Painting* (National Occupational Health and Safety Commission, 1991);

- Employers should ensure that NOHSC exposure standards for all of the components of the final paint mix are not exceeded in the workplace;

- Safety goggles should be selected and fitted in accordance with Australian Standard (AS) 1336 (Standards Australia, 1994) to comply with Australian/New Zealand Standard (AS/NZS) 1337 (Standards Australia/Standards New Zealand, 1992);

- Industrial clothing should conform to the specifications detailed in AS 2919 (Standards Australia, 1987) and AS 3765.2 (Standards Australia, 1990);

- Impermeable gloves or mittens should conform to AS 2161 (Standards Australia/ Standards New Zealand, 1998);

- All occupational footwear should conform to AS/NZS 2210 (Standards Australia/ Standards New Zealand, 1994);

- Spillage of the notified chemical should be avoided. Spillages should be cleaned up promptly with absorbents which should then be put into containers for disposal;

- Good personal hygiene should be practised to minimise the potential for ingestion;

- A copy of the MSDS should be easily accessible to employees;

If the conditions of use are varied from the notified use (as a coating for automobile bodies), greater exposure of the public may occur. In such circumstances, secondary notification may be required to assess the hazards to public health.

14. MATERIAL SAFETY DATA SHEET

The MSDS for Ftalon TN/100 were provided in accordance with the *National Code of Practice for the Preparation of Material Safety Data Sheets* (National Occupational Health and Safety Commission, 1994).

This MSDS were provided by the applicants as part of the notification statement. They are reproduced here as a matter of public record. The accuracy of this information remains the responsibility of the applicants.

15. REQUIREMENTS FOR SECONDARY NOTIFICATION

Under the Act, secondary notification of the notified chemical shall be required if any of the circumstances stipulated under subsection 64(2) of the Act arise.

16. REFERENCES

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Standards Australia/Standards New Zealand (1994) Australian/New Zealand Standard 2210-1994, Occupational Protective Footwear. Standards Association of Australia/Standards Association of New Zealand, Sydney/Wellington.

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