File No: PLC/169

March 2001

NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME

FULL PUBLIC REPORT

2,5-Furandione, polymer with ethenylbenzene, methyloxirane polymer with oxirane 2-aminopropyl methyl ether and methyloxirane polymer with oxirane monomethyl ether, 3-(dimethylamino)propyl amide

(TEGO Dispers 750W)

This Assessment has been compiled in accordance with the provisions of the *Industrial Chemicals (Notification and Assessment) Act* 1989 (the Act) and Regulations. This legislation is an Act of the Commonwealth of Australia. The National Industrial Chemicals Notification and Assessment Scheme (NICNAS) is administered by the National Occupational Health and Safety Commission which also conducts the occupational health & safety assessment. The assessment of environmental hazard is conducted by the Department of the Environment and the assessment of public health is conducted by the Department of Health and Aged Care.

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Director
Chemicals Notification and Assessment

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(TEGO Dispers 750W)

1. APPLICANT

International Sales and Marketing Pty Ltd of 55 Halstead Street, South Hurstville, NSW 2221 (ABN 36 467 259 314) has submitted a notification statement in support of their application for an assessment certificate for the synthetic polymer of low concern (PLC) **TEGO Dispers 750W.** No application was made for information to be exempt for publication in Full Public Reports.

2. IDENTITY OF POLYMER

Chemical name:

2, 5-Furandione, polymer with ethenylbenzene, methyloxirane polymer with oxirane 2-aminopropyl methyl ether and methyloxirane polymer with oxirane monomethyl ether, 3-(dimethylamino)propyl amide

CAS number: 225367-02-2

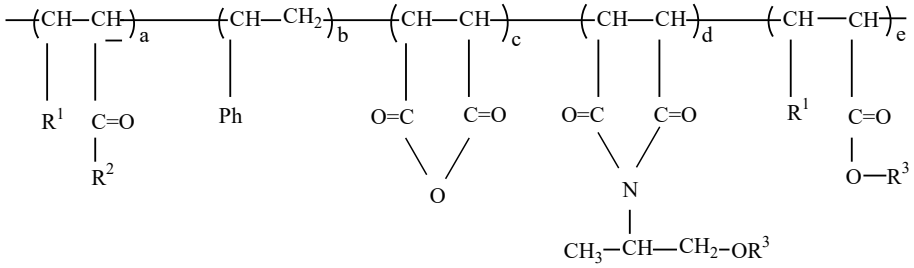
Marketing names:

TEGO Dispers 750W

Molecular formula:

Not available

Structural formula:



R^1 = -COOH

R^2 = $-NH-CH_2-CH_2-CH_2-N^+(CH_3)_2-O^-$

R^3 = -(EO/PO)-CH_3

Reactive functional groups:

Acid anhydride – high concern
Amine – high concern
Carboxylate – low concern

Functional group equivalent weight (FGEW):

23,000 daltons (for secondary amine group)

Molecular weight (MW):

Number-average MW	Weight-average MW	% MW < 1000	% MW < 500	Method
11620	35070	1.0	0.5	GPC

Structural identification method: Infrared (IR) spectroscopy, Nuclear Magnetic Resonance Spectroscopy

IR peaks at 3028, 2869, 1781, 1734, 1700, 1602, 1454, 1374, 1350, 1298, 1250, 1111, 952, 848, 762 and 702 cm^{-1}.

Comments on Chemical Identity:

The new polymer is characterised as an aqueous solution of a modified maleic anhydride/styrene copolymer. The starting material is already a polymer in which the anhydride part is stepwise modified with the corresponding reactants.

The polymer contains a secondary amine group, dialkylamino, which is potentially cationic. However, as the new polymer is used as a dispersant for pigments in paint, after application it will remain in a solid phase (cured resin).

3. POLYMER COMPOSITION AND PURITY

Polymer constituents

Constituent	CAS no.	% weight	% residual
Styrene (ethenylbenzene)	100-42-5	19.1	None detected
Maleic anhydride (2,5-furandione)	108-31-6	5.2	None detected
Oxirane, methyl-, polymer with oxirane, monomethyl ether	9063-06-3	23.7	None detected
Oxirane, methyl-, polymer with oxirane, 2-aminopropylmethyl ether	83713-01-3	51.6	None detected
1,3-Propanediamine, N,N-dimethyl-	109-55-7	0.4	None detected

Purity (%):

Not determined

Hazardous impurities (other than residual monomers and reactants):

None

Non-hazardous impurities at 1% by weight or more:

None

Additives/adjuvants:

None

4. PLC JUSTIFICATION

The notified polymer meets the PLC criteria. Although the polymer is cationic, the FGEW for the amine group is greater than 5000. The high concern acid anhydride group is not relevant in this case as the NAMW of the notified polymer is greater than 10,000.

5. PHYSICAL AND CHEMICAL PROPERTIES

The notified polymer is manufactured as a 40% aqueous solution. The properties listed below are for the polymer solution.

Property	Result	Comments
Appearance	Amber coloured liquid	
Melting point	Not determined	
Density	1.075 g/cm^3 at 25°C	
Water solubility	Soluble	See comments below
Vapour pressure	2.5 kPa at 20°C	
Flammability	Not determined	
Autoignition temperature	Not determined	
Explosive properties	Not explosive	
Stability/reactivity	Stable	

5.1 Comments on physical and chemical properties

The polymer has a high molecular weight and is dispersible in water in high concentration due to the of pendant ionic groups attached to the acrylic backbone. The pH of the polymer solution is 6-7.

6. USE, VOLUME AND FORMULATION

Use:
The polymer will be employed as a wetting and dispersant additive for aqueous pigment concentrates used by colour concentrate and surface coating producers such as paint and ink manufacturers. The proportion of the polymer contained in the final products will be as follows:

Colour concentrates:	5-30% in inorganic pigment 20-70% in organic pigment 40-120% in carbon black
Coating systems (paints):	0.5-2.0%

Manufacture/Import volume:
The notified polymer will be imported at a rate of 25 tonnes/year for the first 5 years.

Formulation details:
The notified polymer will be imported in 20 L and 200 L steel drums as a 40% aqueous solution.

7. OCCUPATIONAL EXPOSURE

Exposure route	Exposure details	Controls indicated by notifier
Import and Storage		
Unpacking containers, palletising, labelling, rack storage (3 workers)		
Dermal and/or ocular	Possible skin/eye contamination if containers breached accidentally	None specified
Formulation into Pigment Dispersion Additive		
Batch weighing, adding to mixing pots, bead milling (1-2 workers)		
Dermal and/or ocular	Possible skin/eye contamination from spills and splashes (40% notified polymer)	Good ventilation; safety glasses, protective gloves, overalls/dustcoat
Lab testing (1 worker)		
Dermal and/or ocular	Possible skin/eye contamination from spills and splashes during sampling and analysis (40% and 4% notified polymer)	Good ventilation; safety glasses, protective gloves, dustcoat
Packing into 20 or 30 L plastic containers (1 worker)		
Dermal and/or ocular	Possible skin/eye contamination if spillage occurs (4% notified polymer)	Good ventilation; safety glasses, protective gloves, overalls/dustcoat

Formulation of Surface Coatings and Inks		
Adding pigment dispersions to emulsions, paints and inks		
Dermal and/or ocular	Possible skin/eye contamination from spills and splashes during weighing and transfer (4% notified polymer)	Safety glasses, protective gloves, overalls
Packing		
Dermal and/or ocular	Possible skin/eye contamination if spillage occurs (0.04-0.12% notified polymer)	Safety glasses, protective gloves, overalls/dustcoat
End use		
Paint application – professional and DIY		
Dermal and/or ocular	Possible skin/eye contamination from spills and splashes during mixing, application and cleaning of equipment (0.04-0.12% notified polymer)	Overalls
Disposal		
Drum cleaning/recycling or disposal		
Dermal	Possible skin contamination from spills and splashes during rinsing of drums (≤ 40% notified polymer)	None specified

8. PUBLIC EXPOSURE

The imported product and formulated pigment dispersions are for industrial use only and the final paint products are expected to be used by professional painters and DIY painters. The public will come into contact with painted articles, including masonry, plasterboard and timber. However, after application, the polymer in low concentration in paint becomes a stable part of the cured resin and will not be available for absorption by biological membranes. Therefore, the potential for public exposure to the notified polymer is considered to be very low.

9. ENVIRONMENTAL EXPOSURE

9.1. Release

There is some potential for release of the polymer during the formulation of pigment dispersions and during manufacture of paints, inks and other coatings, which will take place at customer sites within Australia. Spills will be contained by the plant bunding.

The notifier indicated that up to 2% of the imported material (equivalent to 500 kg of the notified polymer) may be left in the 20 and 200 L drums after concentrate formulation. This would be either placed into landfill with the drums or, if the drums are recycled, removed with water or solvent and most likely sent to on site effluent treatment facilities where solid material (including the notified polymer) would become incorporated into waste sludge. The sludge would be either incinerated or sent to landfill.

Further losses from spills and leaks are possible when the pigment dispersions are formulated into paints and coatings, with losses estimated at a maximum of 1% (250 kg of polymer each year). These losses would be contained within plant bunding and sent to on site treatment where the polymer would associate with sludge and be disposed of by incineration or into landfill.

Further losses from splashes, residuals left in tins and other sources are also inevitable during final use of the paints and coatings. These are difficult to quantify, however, assuming (as a worst case) that 10% is lost in this manner, then a further loss of up to 2.5 tonnes per annum is possible. Release will be widespread throughout Australia, and at low levels.

9.2. Fate

Once applied to the intended surfaces as a paint, the notified polymer will be incorporated in a hard, durable, inert film and would not present an environmental hazard. The ultimate fate will be industrial landfill or incineration.

Solid waste generated in the formulation and application of the coating is also expected to be disposed of to landfill. If incinerated, the polymer will be destroyed with production of water and oxides of carbon and nitrogen.

No quantitative biodegradation data was provided, but if placed into landfill the polymer is expected to be mineralised to CO_2 and nitrate or ammonia through slow biological and abiotic processes.

The polymer is not expected to cross biological membranes due to the high molecular weight, and should not bioaccumulate (Connell, 1990).

10. EVALUATION OF HEALTH EFFECTS DATA

No toxicological data were submitted.

The health hazards of the constituents and hazardous impurities, additives and adjuvants are tabulated below.

Chemical	Health hazards	Regulatory controls
Constituents		
Styrene	Harmful by inhalation; Irritating to eyes and skin.	NOHSC List of Designated Hazardous Substances (NOHSC, 1999a); NOHSC Atmospheric Exposure Standards; 50ppm TWA, 100ppm STEL (NOHSC, 1995)

Maleic anhydride	Harmful if swallowed; Irritating to eyes, respiratory system and skin; May cause sensitisation by inhalation.	NOHSC List of Designated Hazardous Substances (NOHSC, 1999a); NOHSC Atmospheric Exposure Standards; 0.25ppm TWA (NOHSC, 1995)
1,3-Propanediamine, N,N-dimethyl-	Causes burns; Harmful if swallowed; May cause sensitisation by skin contact.	NOHSC List of Designated Hazardous Substances (NOHSC, 1999a)

11. EVALUATION OF ENVIRONMENTAL EFFECTS DATA

No ecotoxicological data were provided.

12. ENVIRONMENTAL RISK ASSSESSMENT

The environmental hazard from use of the new polymer in paints and coatings is assessed as low. Some release of the polymer during pigment dispersion preparation and in paint formulation is expected (approximately 750 kg maximum per year), and this will be placed into landfill. Up to 10% of the polymer (2.5 tonnes per annum) may also be lost during paint application and most of this is expected to enter the soil compartment. However, this release will be widespread and at low levels.

At the end of their useful lives, articles coated with paint containing the polymer would be incinerated or placed into landfill. In landfill or in soil the polymer will be slowly degraded through biological and abiotic processes with formation of water, CO_2 and nitrate. Incineration would also destroy the polymer, with production of water and oxides of carbon and nitrogen.

Given the above, environmental exposure and the overall environmental hazard is expected to be low.

13. HEALTH AND SAFETY RISK ASSESSMENT

13.1. Hazard assessment

No toxicological data were provided for the notified polymer so it cannot be assessed against the NOHSC *Approved Criteria for Classifying Hazardous Substances* (NOHSC 1999b). However, given that it meets criteria for a Polymer of Low Concern, it is unlikely to be classified hazardous in accordance with NOHSC (1999b).

Three of the monomers are hazardous substances and two (styrene and maleic anhydride) have NOHSC exposure standards. However, monomer levels were undetectable.

13.2. Occupational health and safety

The main route of exposure to the notified polymer would be dermal and ocular. Due to the moderate vapour pressure and good ventilation, inhalation exposure is considered unlikely. Initial formulation into pigment dispersion and disposal of polymer containers would present the greatest possibility of exposure as workers will handle the undiluted 40% aqueous polymer solution. Laboratory testing provides the possibility of exposure to both undiluted and diluted polymer solution. Exposure is less likely after formulation, packing, incorporation into paint and inks and then end-use as the polymer is diluted with other coating components. Once the paints and inks are cured, the notified polymer is not available for absorption.

Workers who handle the polymer during formulation into pigment dispersions, paints and inks will wear personal protective equipment consisting of safety glasses, protective gloves and overalls or dustcoat. These exposure controls will be employed to provide protection not only against exposure to the notified polymer but also to other solvents and constituents of the dispersant solution and paint. These exposure controls combined with a low likely toxicological impact renders the health risk from the notified polymer for these formulation workers low.

Less control over exposure will occur with paint application by professional or DIY painters. Personal exposure protection is likely to consist of overalls and, in the case of spray application, a disposable mask Despite this, the low toxicological profile for the notified polymer renders the health risk for these end-users low.

TEGO Dispers 750W is of low concern to human health and safety and no specific risk reduction measures are necessary.

13.3. Public health

Based on low toxicity and public exposure, TEGO Dispers 750W is considered not to pose a significant risk to public health when used in the proposed manner.

14. MSDS AND LABEL ASSESSMENT

14.1. MSDS

The MSDS 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 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

No special precautions are required for TEGO Dispers 750W. However, in the interests of good occupational health and safety, the following guidelines and precautions should be observed:

- Protective eyewear, chemical resistant industrial clothing and footwear and impermeable gloves should be used during occupational use of the products containing the notified polymer;

- Spillage of the notified polymer should be cleaned up promptly with absorbents and put into containers for disposal;

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

If products containing the notified chemical are hazardous to health in accordance with the NOHSC *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 1999b), workplace practices and control procedures consistent with State and Territory hazardous substances regulations must be in operation.

Guidance in selection of protective eyewear may be obtained from Australian Standard (AS) 1336 (Standards Australia, 1994) and Australian/New Zealand Standard (AS/NZS) 1337 (Standards Australia/Standards New Zealand, 1992); for industrial clothing, guidance may be found in AS 3765.2 (Standards Australia, 1990); for impermeable gloves or mittens, in AS 2161.2 (Standards Australia/ Standards New Zealand, 1998); for occupational footwear, in AS/NZS 2210 (Standards Australia/ Standards New Zealand, 1994a); for respirators, in AS/NZS 1715 (Standards Australia/ Standards New Zealand, 1994b) and AS/NZS 1716 (Standards Australia/ Standards New Zealand, 1994c) and other internationally acceptable standards.

16. REQUIREMENTS FOR SECONDARY NOTIFICATION

Secondary notification may be required if:

(i) any of the circumstances stipulated under subsection 64(2) of the Act arise. If any importer or manufacturer of (the notified chemical) becomes aware of any of these circumstances, they must notify the Director within 28 days; or

(ii) the notified polymer is introduced in a chemical form that does not meet the PLC criteria.

17. REFERENCES

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.

National Occupational Health and Safety Commission (1994b) National Code of Practice for the Labelling of Workplace Substances [NOHSC:2012(1994)]. Australian Government Publishing Service, Canberra.

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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National Occupational Health and Safety Commission (1999b) Approved Criteria for Classifying Hazardous Substances [NOHSC:1008(1994)]. Australian Government Publishing Service, Canberra.

Standards Australia (1990) Australian Standard 3765.2-1990, Clothing for Protection against Hazardous Chemicals Part 2 Limited protection against specific chemicals. Standards Association of Australia.

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Standards Australia/Standards New Zealand (1992) Australian/New Zealand Standard 1337-1992, Eye Protectors for Industrial Applications. Standards Association of Australia/ Standards Association of New Zealand.

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

Standards Australia/Standards New Zealand (1994b) Australian/New Zealand Standard 1715-1994, Use and Maintenance of Respiratory Protective Devices. Standards Association of Australia/Standards Association of New Zealand.

Standards Australia/Standards New Zealand (1994c) Australian/New Zealand Standard 1716-1994, Respiratory Protective Devices. Standards Association of Australia/Standards Association of New Zealand.

Standards Australia/Standards New Zealand (1998) Australian/New Zealand Standard 2161.2-1998, Occupational protective gloves, Part 2: General requirements. Standards Association of Australia/Standards Association of New Zealand.