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NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME

FULL PUBLIC REPORT

VESTAGON BF 1540

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Director
Chemicals Notification and Assessment

FULL PUBLIC REPORT

VESTAGON BF 1540

1. APPLICANT

Robert Bryce and Co Ltd, 145-147 Glenlyon Road, Brunswick, Victoria 3056

2. IDENTITY OF THE CHEMICAL

Trade name: Vestagon BF 1540

Number-average molecular weight: >1000

Maximum percentage of low molecular weight species (MW< 1000): <10%

Based on the nature of the chemical and the data provided, Vestagon BF 1540 is not considered to be a hazardous chemical. Therefore, the chemical name, CAS No, monomers, structural and molecular formula and spectral data have been exempted from publication in the Full Public Report and the Summary Report.

Method of detection and determination: Vestagon BF 1540 may be detected by infrared spectrophotometry.

3. PHYSICAL AND CHEMICAL PROPERTIES

Appearance at 20°C and 101.3 kPa: solid, colour unspecified supplied in the form of large flakes.

Melting Range: 105-115°C

Density: 1070 kg/m^3 at 20°C

Vapour Pressure: 0.001 kPa at 20°C

Water Solubility:	stated to be sparingly soluble in water Additional information provided and the literature (1) supports the statement in the submission that the substance is water insoluble.
Hydrolysis as a function of pH	a member of the polymeric chain may hydrolyse in acid or base media. However its conversion will not degrade the polymeric chain and not increase the water solubility of the substance. This reaction is stated to be very slow at ambient temperature and the necessary acid or base conditions are not expected in its stated use.
Partition coefficient:	Although no data were provided for this property, the substance's stated water insolubility would make analyses very difficult.
Dissociation constant:	The substance has no basic or acidic properties.
Flash Point:	>150°C
Flammability Limits:	non-flammable
Pyrolysis products:	isocyanate vapours may be released at temperatures >160°C; combustion products have not been analysed but isocyanates, ammonia and amines, carbon monoxide, carbon dioxide and miscellaneous hydrocarbons could be expected to be formed.
Autoignition Temperature:	450°C
Explosive Properties:	may form a dust cloud which may explode or ignite

Reactivity/Stability: not compatible with strong oxidants. Heating in the presence of acids or bases may lead to the formation of carbon dioxide, monomeric alcohols and amine derivatives.

Particle size distribution	approx 5 mm range - up to 1 cm

4. PURITY OF THE CHEMICAL

Degree of purity: 75%

Additives/Adjuvants: none

5. INDUSTRIAL USES

Vestagon BF 1540 is a crosslinking agent in polyurethane powder coating systems to produce weather resistant surface coatings for such items as agricultural machinery, excavation and other construction machinery, motor vehicle parts, bicycles and domestic commercial and industrial fittings. It will be imported in quantities of 20-100 tonnes annually and formulated into powder coatings for application.

6. OCCUPATIONAL EXPOSURE

Vestagon BF 1540 will be imported ready for use in 20 kg polyethylene-lined sacks and will not require repackaging. During storage and handling, exposure will only occur in the event of an accidental spill.

Workers in other categories will be exposed in the following fashion:

Development and laboratory staff will test spray the milled material and the compounded material.

Those involved in the manufacture of the powder coating will weigh the raw material, mix the compound, grind the compounded material, package it and clean the equipment.

Applicators of the powder will load and clean spray booths.

7. PUBLIC EXPOSURE

Vestagon BF 1540 will be manufactured in Germany and reformulated in Australia. It is a crosslinking agent, used in polyurethane powder coating systems and will be mixed with polyester resins for spray application to produce weather resistant surfaces on domestic, commercial and industrial products. The estimated import of Vestagon BF 1540 is
20 - 100 tonnes and transport will be in 20 kg sacks with polyethylene liners. Uncured powder coating entering the waste stream of processing plants is expected to be a maximum of 2%. Waste disposal is to be in landfill.

The use pattern, transport and waste disposal of Vestagon BF 1540 is not expected to give rise to significant public exposure.

8. ENVIRONMENTAL EXPOSURE

8.1 Release

The company indicates that the notified substance will replace existing chemicals. Vestagon BF 1540 will be reformulated into powder coating paint at ICI Dulux Powder Coatings at Clayton, Victoria and will be supplied to 20 major paint manufacturing companies.

The substance (co-reactant), in the form of solid flakes, is combined with a saturated polyester resin and processed to a powder without chemical modification, via homogenisation, extrusion, crushing and sieving. The finished powder is stored in sealed plastic lined fibreboard boxes for distribution to the manufacturer's customers. The notifier did not have direct information on its 20 application customers but they are expected to be located in the major urban centres of Australia.

The notifier indicates the maximum level of wastes generated from formulation and use per annum will be 2 tonnes (2% of 100 tonnes), of which formulation wastes from the Clayton site will account for 1 tonne and the remainder from the 20 powder coating application plants. Consistent with information previously provided for waste disposal at the ICI Dulux Clayton site, formulation wastes from container residues and equipment cleaning

are likely to be sent to an on-site settling pond to form solid cake sludge which is disposed of to landfill according to a Victorian EPA site license. It is estimated that the application plants utilise 99% of the powder coating, using the electrostatic application process, with the remainder collected in recovery units. The notifer estimates that, as a result, a maximum 1.0 tonnes of Vestagon BF 1540 in powder coating waste will be disposed of to landfill by application plants at 50 kg.year^{-1} per site.

There is no indication of the location and security status of the landfill sites, and these are expected to vary across Australia.

8.2 Fate

While a maximum of 2.0 tonnes of Vestagon BF 1540 will be disposed of to landfills throughout Australia annually, it should be noted the substance is encapsulated (and possibly further crosslinked) in the insoluble polymer, and leaching potential is expected to be low.

8.3 Environmental Exposure

The main route of environmental exposure for the notified substance will occur when powder coating wastes are disposed of to landfill. Given its hydrolytic stability, the substance appears likely to persist in the environment, although its urethane structure would not be expected to resist degradation indefinitely. However, it is unlikely to leach from landfill as it is encapsulated in the polyester powder coating.

9. EVALUATION OF TOXICOLOGICAL DATA

Vestagon BF 1540 is a polymer of average number molecular weight (NAMW) >1000. Under the *Industrial Chemicals (Notification and Assessment) Act, 1989*, no toxicity tests are required. However, three such tests were carried out and reports submitted.

9.1 Acute Toxicity

Test	Species	Outcome	Ref
Oral toxicity	Rat	LD_{50}>15g/kg	(2)

9.1.1 Oral Toxicity (2)

A range finding study was conducted in which sets of two female rats received single oral doses 5, 10 or 15 g/kg of Vestagon BF 1540. No mortality occurred at any dose and the 15 g/kg dose was selected for the study. Ten male and ten female SPF Wistar rats received 15 g/kg by gavage and were observed at infrequent intervals over a 14 day period. No control group was used.

No deaths occurred and no clinical signs and symptoms were noted during the study. No abnormalities were found on macroscopic examination at necropsy.

9.2 Genotoxicity

9.2.1 Mutagenicity assay in *Salmonella typhimurium* (3)

Vestagon BF 1540 as a solution in DMSO was tested against *Salmonella typhimurium* strains TA1535, TA1537, TA1538, TA98 and TA100 in concentrations of up to 5000 ug/plate in the presence and absence of liver microsomes induced by Araclor (3). Water and DMSO were used as negative controls.

Positive controls were used:

TA 98 and TA 1538	nitrofluorene, 2.5 ug/plate
TA 100	aminoanthracene, 10 ug/plate and sodium azide, 2.5 ug/plate
TA 1535	sodium azide, 2.5 ug/plate
TA 1537	aminoacridine, 50 ug/plate

Aminoanthracene demonstrated that the liver microsome preparation was effective in metabolising the test agent. Positive controls showed an increase in revertant colony counts.

Plates containing concentrations of 250 ug or more Vestagon BF

1540/plate precipitated. The test compound did not increase the number of revertant colonies/plate.

The notified chemical was found not to be mutagenic against *Salmonella typhimurium* in this test.

9.2.2 Mouse micronucleus study (4)

Groups of five male and five female Albino mice, strain Bor NMRI/SPF Han, received a single oral administration of 3000 mg/kg Vestagon BF 1540 in DMSO. Bone marrow was examined 24, 48 and 72 hours after administration and the number of micronuclei/1000 polychromatic erythrocytes counted. Results from a negative control group were included in the study report. Cyclophosphamide, 100 mg/kg, served as the positive control. Mice from the positive control group were sacrificed and the bone marrow examined 24 hours after administration.

Four mice, two male and two female, in the test group to be assessed at 72 hours, died within hours of receiving Vestagon BF 1540 of an unknown cause.

Vestagon BF 1540 was found not to increase micronucleus formation in the mouse.

9.3 Overall Assessment of Toxicological Data

Vestagon BF 1540 has negligible acute oral toxicity in rats and was not found to be genotoxic towards *Salmonella typhimurium* or in the mouse micronucleus test.

10. ASSESSMENT OF ENVIRONMENTAL EFFECTS

Test	Species	Result
Acute toxicity	Golden orfe	48h LC_{50}=>1000mg.L^{-1}

The provision of ecotoxicological data is not a requirement for polymers of NAMW > 1000 according to the Act. However, reports were provided and these indicate the above test was satisfactorily conducted according to German standards. As the test substance is considered water insoluble, acetone was used as a co-solvent to obtain polymer concentrations of 1 g.L^{-1}.

11. ASSESSMENT OF ENVIRONMENTAL HAZARDS

Ecotoxicity hazard

Ecotoxicity results indicate Vestagon BF 1540 is practically non-toxic to fish and mammals.

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

The amount that will reach the environment, through disposal of powder coating wastes to landfill, is unlikely to present a hazard to the environment, based on the ecotoxicity data submitted.

12. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY

Vestagon BF 1540 is supplied in large flakes which minimise the likelihood of dust formation but if a dust cloud is generated the dust may ignite or explode.

Exposure may be by skin or eye contact with the dust or flake. Formulators will be exposed to flakes of Vestagon BF 1540 itself, which are greater than respirable size. No data on eye irritation was available. However, dusts should be avoided. The formulated powder coating is in particles < 100 um in size. Precautions against nuisance dusts will be advised.

If Vestagon BF 1540 is heated above 160^{O}C, isocyanates may form. Respiratory protective apparatus should be worn.

Vestagon is not compatible with and should not be stored with strong oxidising agents.

13. RECOMMENDATIONS FOR THE CONTROL OF PUBLIC AND WORKER EXPOSURE

To minimise public and worker exposure to Vestagon BF 1540 the following guidelines and precautions should be observed:

. avoid generation of a dust cloud;

. general mechanical ventilation or local exhaust ventilation should be used to control dust or fumes when formulating powder coatings;

. workers exposed to dust should wear a dust mask conforming to Australian standard AS 1715-1991 (5).

. workers exposed to fume should wear half face filters suitable for organic vapours and conforming to Australian Standard AS 1715-1991 (5).

. workers exposed to Vestagon BF 1540 should wear impervious PVC gloves conforming to AS 2161-1978 (6).

. wear protective overalls conforming to AS 3765.1-1990 (7).

. wear chemical splash goggles or a face shield conforming to Australian Standard 1337 -1984.(8)

. workers exposed to Vestagon BF 1540 and products containing it should have access to MSDS.

14. MATERIAL SAFETY DATA SHEET

The Material Safety Data Sheet (MSDS) for Vestagon BF 1540 was provided in Worksafe Australia format (9).

15. REQUIREMENTS FOR SECONDARY NOTIFICATION

Under the *Industrial Chemicals (Notification and Assessment) Act 1989* (the Act), secondary notification of Vestagon BF 1540 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) Saunders J H and Frische K C, *Polyurethanes: Chemistry and Technology - Part 1*, p111, Interscience Publishers - John Wiley.

(2) *Crosslinking agent free of blocking agents. Acute oral toxicity for rats.* Data on File, Robert Bryce and Co.

(3) *Determination of the mutagenicity of IPDI adduct BF 1540 in the Ames salmonella mutagenicity test complying with directive 84/449/EEC B.14.* Data on File Robert Bryce and Company

(4) *ipdi adduct BF 1540/mutagenicity test in the mammalian micronucleus test.* Data on File Robert Bryce and Company

(5) *Australian Standard 1715- 1991 Selection, Use and Maintenance of Respiratory Protective Devices*, Standards Association of Australia Publ, Sydney 1991.

(6) *Australian Standard 2161-1978 Industrial Safety Gloves and Mittens (excluding Electrical and Medical Gloves*), Standards Association of Australia Publ, Sydney 1978.

(7) *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.

(8) *Australian Standard 1337-1984 Eye Protectors for Industrial Applications*, Standards Association of Australia Publ, Sydney 1984.

(9) *Guidance Note for Completion of a Material Safety Data Sheet. [NOHSC : 3001 (1991)]*, 3rd Edition, October 1991.