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**NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION
AND ASSESSMENT SCHEME**

FULL PUBLIC REPORT

Polymer in Astacin Top 140

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Director
Chemicals Notification and Assessment

FULL PUBLIC REPORT**Polymer in Astacin Top 140****1. APPLICANT**

BASF Australia Ltd of 500 Princes Highway NOBLE PARK VIC 3174 has submitted a limited notification statement in support of their application for an assessment certificate for Polymer in Astacin Top 140.

2. IDENTITY OF THE CHEMICAL

Polymer in Astacin Top 140 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, molecular weight, spectral data and details of the polymer composition have been exempted from publication in the Full Public Report and the Summary Report.

Other Name: Polymer in Astacin Top 140

**Method of Detection
and Determination:**

the polymer has been isolated by gel permeation chromatography (GPC; a GPC spectrum was supplied with the notification) and identified by infrared spectroscopy

3. PHYSICAL AND CHEMICAL PROPERTIES

The polymer itself will never be isolated . It is manufactured as a 40% dispersion in water. The following data refer to the imported product, Astacin Top UT (containing 32.5% of the polymer) and Astacin Matting MT 6601 (containing 8.0% of the polymer), unless otherwise stated.

**Appearance at 20°C
and 101.3 kPa:**

milky, with a slight but not unpleasant odour

Boiling Point:

~100°C (as for water)

Density:	1 020 kg/m ³ (Astacin Top UT) 1 030 kg/m ³ (Astacin Matting MT)
Vapour Pressure:	2.3 kPa at 20°C (water) based on the high molecular weight; the polymer itself is expected to have low vapour pressure
Water Solubility:	< 0.3 mg/L
Partition Co-efficient (n-octanol/water):	not determined
Hydrolysis as a Function of pH:	not determined
Adsorption/Desorption:	not determined
Dissociation Constant:	pK _a = 9.1 (Astacin Top 140 dispersion containing 40% polymer in water) pK _b = 8.0
Flash Point:	none when tested up to 100°C
Flammability Limits:	the water based dispersion is not expected to be flammable
Autoignition Temperature:	> 200°C
Explosive Properties:	none expected
Reactivity/Stability:	the polymer is not considered reactive

Comments on Physico-Chemical Properties

The notifier claims that they made a film of the polymer-dispersion to determine the solubility of the polymer in water and octanol. They found that the water solubility was less than 0.3 mg/L, therefore no measurement of log partition co-efficient was possible. It was agreed that the solubility will be low. While there is a salt functionality, this comprises only 2% of the polymer.

The other properties are difficult to determine for poorly soluble polymers of high molecular weight and complexity. The notifier claims that on the basis of hydrolysis of similar polymers, hydrolytic decomposition of the notified polymer is highly unlikely and is possible due to low solubility.

As the water is removed from the dispersion by evaporation, the polymer becomes more viscous and "tacky". The notifier claims that the polymer should bind to soil and become "fixed". The extent of binding with soil will depend on the porosity and moisture content of the soil.

The data presented for dissociation constant is based on the notified polymer in

dispersion (40% concentration). The presence of buffers to allow the polymer to disperse in water will have a significant effect on the results. Therefore the results are not representative of the actual polymer.

4. PURITY OF THE CHEMICAL

Degree of Purity: > 99%

**Non-hazardous Impurities
(> 1% by weight):** none

5. USE, VOLUME AND FORMULATION

The notified polymer will be used in products designed as finish binders in the leather industry. It will be incorporated into two products, namely, Astacin Top UT and Astacin Matting MT. These are then used in leather finishing formulations to promote fastness to the leather surface which will then be used for automotive/domestic upholstery and shoe leathers.

The polymer will be imported as a 32.5% (Astacin Top UT) and 8.0% (Astacin Matting MT) dispersion at a rate of 1 to 10 tonnes per annum for the first two years and thereafter 10 to 30 tonnes per annum for the next three years.

6. OCCUPATIONAL EXPOSURE

Both products containing the polymer dispersion will arrive in Australia in 120 kg open head polyethylene drums as part of a mixed load of chemicals. The notifier estimates that 1 to 2 people will be involved in receiving the import at the dock and 1 to 2 transport drivers will be involved in road transport from the dock to the importer's warehouse in Victoria. At the warehouse 1 to 3 storepersons will unload the container. The dispersion will then be distributed by road to approximately 5 tanneries in Australia. Exposure of transport and storage personnel is expected only in the event of accidental spillage.

At each tannery 1 to 3 operators will unload the drum(s) of dispersion and 1 to 4 operators will be involved in weighing the product and mixing it with other ingredients (usually water, but may include "normal finishing binders") to a final polymer concentration of approximately 20%. The mixing process will be conducted in the production area and is expected to involve one worker for 1.16 hours/week. The production area is expected to be fitted with local exhaust ventilation.

The mix will be applied to leather hides at ambient temperature by a rotogravure machine at a rate of 40 g/m². Daily polymer usage is anticipated to be 10 to 20 kg for Astacin Top UT and 2 to 5 kg for Astacin Matting MT. Application will, be conducted by one to two workers for up to 8 hours/day. Cleaning of the rotogravure

machinery will be conducted once daily and will involve the removal of approximately 0.3 kg polymer from the roller. The application area is expected to be fitted with local exhaust ventilation.

Taking into account the number of customer facilities that will be using the products containing the notified polymer, the total number of workers that will be involved in the tanning processes described above will be a maximum of 20.

The main occupational route for workers involved in the processes mentioned above will be dermal. Accidental eye contact may also occur due to splashes. Inhalational exposure is unlikely due to the low vapour pressure of the polymer dispersion.

7. PUBLIC EXPOSURE

Most of the notified polymer will enter the public domain as a coating on finished shoes or vehicle upholstery. Although public contact with the notified polymer will occur, Astacin Top 140 is expected to adhere to the leather substrate, minimising its potential for absorption.

Once imported, the new products are available only to industrial processors and not to the general public. There is very limited scope for public exposure to the notified polymer during these processes.

8. ENVIRONMENTAL EXPOSURE

Release

There should be no release to the environment during transport and storage except in a major accident.

At the leather tanneries, Astacin Top UT/Astacin Matting MT are weighed and mixed with water and other chemicals such as finishing binders. A dilution containing Astacin Top LD 140 is applied to leather as a pre-coat using rotogravure or spray machines. After treatment with the chemical the leather is allowed to dry naturally in a well ventilated drying room.

The notifier claims that when the notified polymer product is applied by rotogravure machines, no overspread will occur. The only losses are through cleaning the application equipment. Rotogravure machines are cleaned once a day. Waste water washings are collected and treated in the company's effluent treatment plant. The waste is treated to separate the solids and the waste water is flocculated and desludged before discharge to the sewer.

When the polymer product is applied by spray machine, appropriate filters are installed to filter out any overspray that may occur. The notifier did not give an indication to the extent of this overspray. The filters will be disposed of to approved disposal sites.

Minor spills and drips during above operations are contained and soaked up with earth or sand and disposed appropriately. If large spills occur they will be diverted to the plant's waste water treatment plant for appropriate treatment such as flocculation.

Fate

The fate of the bulk of the polymer will be tied to the fate of the finished leather. Leather that has been treated with the polymer is expected to be used in making leather products. Most of the treated leather will be landfilled, either as trimmings during the making of leather articles or when the goods are finally disposed of.

The waste solution from the cleaning of rotogravure machines is diverted to the company's waste water treatment plant where the small amount of polymer is flocculated and desludged before discharge to the sewer. Draft ANZECC Guidelines (for Tanning and Related Industries) (3) state that treatment of wastes to be disposed of to sewer should achieve the quality required by the treatment plant for trade wastes. Release of the polymer to the aquatic environment would therefore be negligible.

Waste containing the polymer, generated during trimming, shaving and buffing of treated hides, and as sludge from waste water treatment is expected to be disposed of through landfill or incineration. Incineration will destroy the polymer.

As stated in the Material Safety Data Sheet (MSDS), degradability has been estimated at 20 to 70% DOC reduction (OECD TG 302B Modified Zahn-Wellens Test for Inherent Biodegradability) based on products of a "similar structure and composition". The structures of these chemicals were not sighted.

9. EVALUATION OF TOXICOLOGICAL DATA

No data were provided. Toxicological data are not required according to the Act for polymers with NAMW greater than 1 000.

10. ASSESSMENT OF ENVIRONMENTAL EFFECTS

No ecotoxicology data were provided, which is acceptable for polymers of NAMW greater than 1000 according to the Act. Such polymers are too large to cross biological membranes (4,5,6).

The company has provided the following results in the MSDS. These are derived from products of "similar structure and composition". Toxicity to fish, (Golden Orfe, *Leuciscus idus*): 96 h LC₅₀ greater than 500 mg/L. Toxicity to bacteria (Warburg test): greater than 100 mg/L. Reports and chemical structures were not made available by the notifier.

11. ASSESSMENT OF ENVIRONMENTAL HAZARD

Most of the polymer will be disposed of to landfill with the leather to which it is cured. There will be no environmental hazard from such cured polymer.

The company estimates that each tannery will dispose up to 0.8 kg of Astacin Top 140 daily to its waste water treatment plant through the cleaning of rotogravure machines at the end of the day. With Astacin Top UT containing 32.5% of the notified polymer, the total annual discharge of the polymer to the treatment plants of all 5 tanneries is estimated at less than 300 kg. As most of this is trapped in the company's waste water treatment plant and disposed of as landfill or incineration, there is no significant hazard to the aquatic environment.

Small amounts of the polymer arriving in landfill in an uncured form, *ie* that contained in filters from the spray application process, from waste during the after tanning process and that adsorbed to sludge in the waste water treatment plant, will remain bound to soil due to the very low water solubility of the polymer. Incineration of such waste will destroy the polymer producing water and oxides of carbon and nitrogen.

Overall, the environmental hazard from the proposed import rates and use of the polymer is negligible.

12. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY EFFECTS

The notified polymer has a NAMW greater than 1 000 and is therefore unlikely to cross biological membranes and cause systemic effects. It has a low percentage of low molecular weight species less than 1 000 (3.7%) and 500 (2.1%). The polymer is stable, has low volatility under ambient conditions, is non-flammable, has no explosive properties and is not expected to react with other materials.

The notified polymer has a low level of residual monomers, which are known to cause skin and eye irritation and respiratory effects. All residual monomers are present at concentrations below the threshold requiring classification according to Worksafe Australia's *Approved Criteria for Classifying Hazardous Substances* (Approved Criteria) (7).

2-pyrrolidine 1-methyl- which is a component of the polymer dispersion, has the potential to cause skin and eye irritation. It constitutes up to 0.1% in the formulations which is at a lower concentration than the threshold listed for classification of mixtures according to Worksafe Australia's *List of Designated Hazardous Substances* (1).

There will be no worker exposure during transport and storage operations unless there is an accidental spill. The procedures outlined in the MSDS (personnel to wear protective clothing, goggles and gloves; spills to be contained and soaked up with absorbent material and placed in closed labelled containers) will be adequate to minimise exposure during clean-up operations.

During the chemical's use as an after-tanning agent, worker exposure may occur during weighing, mixing and open transfer operations as well as during operation, maintenance and cleaning of the rotogravure machinery. The product will be used at ambient temperatures in a liquid form only. As the polymer is expected to have a low vapour pressure and it is unlikely that aerosols or mists will be generated during use, the potential for inhalational exposure will be negligible. The most likely routes of exposure during use will therefore be skin and eye contact. The use of protective clothing, eye protection and gloves will reduce the exposure levels. Given the low hazards associated with the polymer risks to workers should be low.

The potential for public exposure to the notified polymer arising from leather treatment processes is negligible. There may be widespread public contact with the notified polymer on the surface of treated leather goods, but its adhesion to the substrate and physico-chemical properties will be sufficient to preclude absorption across the skin or other biological membranes.

In the case of accidental spillage during transport, the public may be exposed to the notified polymer. Public exposure resulting from transport and disposal is expected to be negligible.

13. RECOMMENDATIONS

To minimise occupational exposure to Polymer in Astacin Top 140, the following guidelines and precautions should be observed:

- Safe practices for handling any chemical formulation, should be adhered to and include:
 - minimising spills and splashes:
 - practising good personal hygiene; and
 - practising good house keeping and maintenance including bunding of large spills which should be cleaned up promptly with absorbents and put into containers for disposal.

In addition, when handling the imported formulations Astacin Top UT/Astacin Matting MT, protective clothing conforming to and used in accordance with Australian Standard (AS)2919 (8) and protective footwear conforming to Australian/New Zealand Standard (AS/NZS) 2210 (9) should be worn as a matter of course. It is advisable when handling the polymer solution to wear chemical-type goggles (selected and fitted) according to AS 1336 (10) and meeting requirements of AS/NZS 1337 (11) and impermeable gloves AS 2161-1978 (12), to minimise exposure to other, hazardous, constituents of the formulation.

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

14. MATERIAL SAFETY DATA SHEET

The MSDS for the products containing the notified chemical were provided in accordance with the *National Code of Practice for the Preparation of Material Safety Data Sheets* (13).

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

15. REQUIREMENTS FOR SECONDARY NOTIFICATION

Under the Act, secondary notification of the notified polymer 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. National Occupational Health and Safety Commission 1994, *List of Designated Hazardous Substances* [NOHSC:10005(1994)], Government Publishing Service Publ., Canberra.
2. Australian 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 Publ., Canberra.
3. ANZECC and ARMCANZ, 1995, "Draft Effluent Management Guidelines for Tannery and Related Industries - December 1995", Commonwealth of Australia, Canberra.
4. Nabholz, J.V., Miller, P and Zeeman M. 1993, "Environmental Risk Assessment of New Substances under the Toxic Substances Control Act Section Five". In Landis WG, Hughes JS & Lewis, MA (Eds), *Environmental Toxicology and Risk Assessment*, American Society for Testing and Materials, ASTM STP 1179, Philadelphia. pp 40-55.
5. Anliker R., Moser P and Poppinger D., 1988, "Bioaccumulation of dyestuffs and organic pigments in fish. Relationships to hydrophobicity and steric factors". *Chemosphere* 17: pp 1631-1644.
6. Gobas F.A.P.C., Opperhuizen A and Hutzinger O, 1986, "Bioconcentration of hydrophobic chemicals in fish: relationship with membrane permeation". *Environmental Toxicology and Chemistry* 5: pp 637-646.

7. National Health and Safety Commission 1994, *Approved Criteria for Classifying Hazardous Substances* [NOHSC:1008(1994)], Australian Government Publishing Service Publ., Canberra.
8. Standards Australia, 1987, *Australian Standard 2919 - 1987, Industrial Clothing*, Standards Association of Australia Publ., Sydney.
9. Standards Australia, Standards New Zealand 1994, *Australian/ New Zealand Standard 2210 - 1994 Occupational Protective Footwear, Part 1: Guide to Selection, Care and Use. Part 2: Specifications*, Standards Association of Australia Publ., Sydney, Standards Association of New Zealand Publ. Wellington.
10. Standards Australia 1994, Australian Standard 1336-1994, *Eye protection in the Industrial Environment*, Standards Association of Australia Publ., Sydney.
11. Standards Australia/Standards New Zealand 1992, *Australian/New Zealand Standard 1337-1992, Eye Protectors for Industrial Applications*, Standards Association of Australia Publ., Sydney, Standards Association of New Zealand Publ, Wellington.
12. Standards Australia 1978, Australian Standard 2161-1978, *Industrial Safety Gloves and Mittens (excluding Electrical and Medical Gloves)*, Standards Association of Australia Publ., Sydney.
13. National Occupational Health and Safety Commission 1994, *National Code of Practice for the Preparation of Material Safety Data Sheets* [NOHSC:2011(1994)], Australian Government Publishing Service, Canberra.