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**NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION
AND ASSESSMENT SCHEME**

FULL PUBLIC REPORT

Polymer in Astacin Top LD 6601

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Director
Chemicals Notification and Assessment

FULL PUBLIC REPORT**Polymer in Astacin Top LD 6601****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 LD 6601.

2. IDENTITY OF THE CHEMICAL

Polymer in Astacin Top LD 6601 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 LD 6601

Method of Detection and Determination: the polymer has been isolated by gel permeation chromatography (GPC), and identified by infrared spectroscopy

3. PHYSICAL AND CHEMICAL PROPERTIES

The polymer itself will never be isolated. The following data refer to the imported product, Astacin Top LD 6601 (containing 30% polymer, 8% 2-pyrrolidinone 1-methyl- and 0.8% proxel XLZ in water), unless otherwise stated.

Appearance at 20°C and 101.3 kPa: clear, slightly yellow aqueous dispersion

Boiling Point: ~100°C (as for water)

Melting point: the solidification temperature is < 0°C
> 300°C (for the polymer)

Density: 1 042 kg/m³

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:	the polymer is insoluble in water based on comparison with similar polymers; the polymer dispersion can be diluted with water in all proportions
Partition Co-efficient (n-octanol/water):	not determined
Hydrolysis as a Function of pH:	not determined; the polymer is not expected to readily hydrolyse based on analogy with other polymers
Adsorption/Desorption:	not determined; upon evaporation the dispersion is expected to become viscous and tacky and bind to soil
Dissociation Constant:	not determined; the polymer is not considered to be soluble in water
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 by comparison with similar synthetic polymers, the notified polymer will be insoluble in water. The polymer is manufactured as a dispersion in water, which is claimed can be diluted with water in all proportions. The water solubility of the polymer will depend on the pH of the medium. At low pH values, at which the polymer exists predominantly in the carboxylic acid form, the solubility in water is expected to be very low. However, at high pH (above 8) the hydrophilicity of the polymer will be higher as it exists in a salt form. However, there is only 6% of this functionality. Therefore, the water solubility is still predicted to be low.

The notifier claims that information from similar materials indicates that hydrolytic decomposition of this material is highly unlikely. It is considered that the notified polymer is unlikely to undergo hydrolytic decomposition in the environmental pH range (1).

Due to the complex nature of the polymer the partition coefficient, adsorption/desorption, and dissociation constant will be difficult to measure. The polymer will have a high partition coefficient in carboxylic acid form again due to low water solubility. Adsorptivity has a strong negative correlation with solubility. Low solubility of polyurethanes suggests that they will have high adsorptivity coefficients. As the water and triethyl amine are removed by evaporation, it becomes viscous and tacky and the polymer will bind to soil and become fixed. The polymer contains dissociable carboxylic acid groups and the pKa is expected to be in the range of 3 to 5.

4. PURITY OF THE CHEMICAL

Degree of Purity: > 98%

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

5. USE, VOLUME AND FORMULATION

The notified polymer will be used as part of a formulation intended as a specific after tanning agent in the leather industry. The formulation (30% polymer dispersion in water and 2-pyrrolidinone 1-methyl-) will enhance the water, oil and stain repellancy of the leather.

The polymer will be imported only as a 30% dispersion at a rate of less than 100 tonnes per year for the first five years.

6. OCCUPATIONAL EXPOSURE

The polymer dispersion will arrive into 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 throughout 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 10 minutes/day. 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 or spray machine at a rate of 40 g/m². Daily polymer usage is anticipated to be 10 to 20 kg of notified chemical. 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.

The main occupational route for workers involved in weighing, mixing and transfer operations, as well as product application, machinery maintenance and machine cleaning, 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. However, there is a possibility of exposure during application by spray machine

7. PUBLIC EXPOSURE

There is negligible potential for public exposure to the notified polymer arising from leather treatment processes. 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.

8. ENVIRONMENTAL EXPOSURE

Release

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

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 of 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) (4) states 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% dissolve organic carbon 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 during environmental assessment.

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 1 000 according to the Act. Such polymers are too large to cross biological membranes (5,6,7).

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.

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 notifier estimates that each tannery will dispose up to 0.3 kg of Astacin Top LD 6601 daily to its waste water treatment plant through the cleaning of rotogravure machines at the end of the day. With Astacin Top LD 6601 containing 30% of the notified polymer, the total annual discharge of the polymer to the treatment plants of all 5 tanneries is estimated at 170 kg. This is less than 1% of the maximum annual import. Most of this is trapped in the company's waste water treatment plant and disposed of as landfill or incineration. This, and the low aquatic toxicity of the polymer, indicates a low 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, are likely to remain bound to soil. 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. However, it has a high percentage of low molecular weight species greater than 1 000 (10.2%) and 500 (6.3%). 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, sensitisation and respiratory effects as well as being flammable. 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) (8).

One component 2-pyrrolidine 1-methyl- of the polymer dispersion has the potential to cause skin and eye irritation. It constitutes up to 8% in Astacin Top LD 6601 and is less than the concentration threshold (10%) listed for classification of mixtures according to Worksafe Australia's *List of Designated Hazardous Substances* (2).

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 labeled 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.

There is negligible potential for public exposure to Polymer in Astacin Top LD 6601 arising from leather treatment process. There may be widespread public contact with the notified polymer on the surface of treated leathers, but its adhesion to the substrate and physico-chemical properties will be sufficient to preclude absorption across the skin or other biological membranes.

13. RECOMMENDATIONS

To minimise occupational exposure to Polymer in Astacin Top LD 6601, 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 formulation Astacin Top LD 6601, protective clothing conforming to and used in accordance with Australian Standard (AS)2919 (9) and protective footwear conforming to Australian/New Zealand Standard (AS/NZS) 2210 (10) 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 (11) and meeting requirements of AS/NZS 1337 (12) and impermeable gloves AS 2161-1978 (13), 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 product containing the notified chemical was provided in accordance with the *National Code of Practice for the Preparation of Material Safety Data Sheets* (14).

This MSDS was 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
3. Browning, S. B. 1983, *Surface Coatings Raw Materials and Their Use*. Volume 1, The New South Wales University Press, NSW, Australia. pp 263-293.
4. ANZECC and ARMCANZ, 1995, "Draft Effluent Management Guidelines for Tannery and Related Industries - December 1995", Commonwealth of Australia, Canberra.
5. 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.
6. Anliker, R., Moser, P and Poppinger, D., 1988, Bioaccumulation of dyestuffs and organic pigments in fish. Relationships to hydrophobicity and steric factors. *Chemosphere* 17(8): pp 1631-1644.
7. 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.

8. National Health and Safety Commission 1994, *Approved Criteria for Classifying Hazardous Substances* [NOHSC:1008(1994)], Australian Government Publishing Service Publ., Canberra.
9. Standards Australia, 1987, *Australian Standard 2919 - 1987, Industrial Clothing*, Standards Association of Australia Publ., Sydney.
10. 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.
11. Standards Australia 1994, Australian Standard 1336-1994, *Eye protection in the Industrial Environment*, Standards Association of Australia Publ., Sydney.
12. 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.
13. Standards Australia 1978, Australian Standard 2161-1978, *Industrial Safety Gloves and Mittens (excluding Electrical and Medical Gloves)*, Standards Association of Australia Publ., Sydney.
14. 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.

Attachment 1

The Draize Scale for evaluation of skin reactions is as follows:

Erythema Formation	Rating	Oedema Formation	Rating
No erythema	0	No oedema	0
Very slight erythema (barely perceptible)	1	Very slight oedema (barely perceptible)	1
Well-defined erythema	2	Slight oedema (edges of area well-defined by definite raising)	2
Moderate to severe erythema	3	Moderate oedema (raised approx. 1 mm)	3
Severe erythema (beet redness)	4	Severe oedema (raised more than 1 mm and extending beyond area of exposure)	4

The Draize scale for evaluation of eye reactions is as follows:

CORNEA

Opacity	Rating	Area of Cornea involved	Rating
No opacity	0 none	25% or less (not zero)	1
Diffuse area, details of iris clearly visible	1 slight	25% to 50%	2
Easily visible translucent areas, details of iris slightly obscure	2 mild	50% to 75%	3
Opalescent areas, no details of iris visible, size of pupil barely discernible	3 moderate	Greater than 75%	4
Opaque, iris invisible	4 severe		

CONJUNCTIVAE

Redness	Rating	Chemosis	Rating	Discharge	Rating
Vessels normal	0 none	No swelling	0 none	No discharge	0 none
Vessels definitely injected above normal	1 slight	Any swelling above normal	1 slight	Any amount different from normal	1 slight
More diffuse, deeper crimson red with individual vessels not easily discernible	2 mod.	Obvious swelling with partial eversion of lids	2 mild	Discharge with moistening of lids and adjacent hairs	2 mod.
Diffuse beefy red	3 severe	Swelling with lids half-closed	3 mod.	Discharge with moistening of lids and hairs and considerable area around eye	3 severe
		Swelling with lids half-closed to completely closed	4 severe		

IRIS

Values	Rating
Normal	0 none
Folds above normal, congestion, swelling, circumcorneal injection, iris reacts to light	1 slight
No reaction to light, haemorrhage, gross destruction	2 severe