

File No: NA/379

Date: August 1996

**NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION
AND ASSESSMENT SCHEME**

FULL PUBLIC REPORT

Polymer in Astacin Ground UH

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 Worksafe Australia which also conducts the occupational health & safety assessment. The assessment of environmental hazard is conducted by the Department of the Environment, Sport, and Territories and the assessment of public health is conducted by the Department of Health and Family Services

For the purposes of subsection 78(1) of the Act, copies of this full public report may be inspected by the public at the Library, Worksafe Australia, 92-94 Parramatta Road, Camperdown NSW 2050, between the hours of 10.00 a.m. and 12.00 noon and 2.00 p.m. and 4.00 p.m. each week day except on public holidays.

For Enquiries please contact the Administration Coordinator at:

Street Address: 92 Parramatta Rd Camperdown, NSW 2050, AUSTRALIA

Postal Address: GPO Box 58, Sydney 2001, AUSTRALIA

Telephone: (61) (02) 9577-9466 **FAX (61) (02) 9577-9465**

Director
Chemicals Notification and Assessment

FULL PUBLIC REPORT

Polymer in Astacin Ground UH

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 the new synthetic polymer in Astacin Ground UH.

2. IDENTITY OF THE CHEMICAL

The notified chemical 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 and details of the polymer composition have been exempted from publication in the Full Public Report and the Summary Report.

Trade name: Astacin Ground UH (dispersion containing 20% new polymer)

Number-average molecular weight: 17000

Weight-average molecular weight: 83000

Maximum percentage of low molecular weight species (molecular weight < 1000):
1% < 1000
0.5% < 500

Method of detection and determination: the polymer has been characterised by gel permeation chromatography (GPC); a GPC spectrum was supplied with the notification

3. PHYSICAL AND CHEMICAL PROPERTIES

The polymer itself will never be isolated. The following data refer to the imported product, Astacin Ground UH (containing 20% polymer and 1.8 % N-methyl-2-pyrrolidone in water), unless otherwise stated.

Appearance at 20°C and 101.3 kPa: clear, water-based, honey coloured free flowing liquid

Melting point: the solidification temperature is 3°C

Boiling point:	~ 100°C (water)
Density:	1020 kg/m ³ at 20°C
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:	~ 500°C
Explosive properties:	none expected
Reactivity/Stability:	the polymer is not considered reactive

Comments on Physico-Chemical Properties

The notifier states that the polymer is expected to have low solubility in water and the N-methyl pyrrolidone is added as a water solubiliser. 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 free carboxylic acid form, the solubility in water is expected to be very low. However, at high pH (above 8) the carboxylic acid groups will be deprotonated and the resulting water solubility of the polymer will be higher (further discussed under Environmental Fate). The polymer is assumed to be in the deprotonated form in the formulated product, Astacin Ground UH.

On the basis of hydrolysis of similar polymers 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, dissociation constant, and adsorption/desorption will be difficult to measure.

The polymer will have a high partition coefficient in carboxylic acid form again due to low water solubility.

The polymer contains dissociable carboxylic acid groups and the pKa is expected to be in the range of 3 - 5. In the polymer formulated product, Astacin Ground UH, triethylamine is added to neutralise the carboxylic acid groups within the polymer and is therefore expected to be present as the triethylammonium cation.

Adsorptivity has a strong negative correlation with solubility. Low solubility of polyurethanes suggests that they will have high absorptivity coefficients. As the water and triethylamine are lost from the polymer formulation, it becomes viscous and tacky and the polymer will bind to soil and become fixed.

4. PURITY OF THE CHEMICAL

Degree of purity: 99%

Toxic or hazardous impurities: two hazardous impurities are to be found on the *List of Designated Hazardous Substances* (2); in the polymer, however, they are at levels below the cut-off concentrations

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

Maximum content of residual monomers: 1%

Additives/Adjuvants: 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 (20% polymer dispersion in water and N-methyl-2-pyrrolidone) will promote adhesion on difficult surfaces such as water-proof leather and will enhance the water, oil and stain repellency of the leather.

The polymer will be imported only as a 20% dispersion at a rate of less than 20 tonnes per year for the first 5 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 1-2 people will be involved in receiving the import at the dock and 1-2 transport drivers will be involved in road transport from the dock to the importer's warehouse in Victoria. At the warehouse 1-3 storepersons will unload the container. The dispersion will then be distributed by road to approximately 5 tanneries throughout Australia. The number of transport drivers involved in distribution was not provided. Exposure of transport and storage personnel is expected only in the event of accidental spillage.

At each tannery, 1-3 operators will unload the drum(s) of dispersion and 1-4 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 ~ 4%. The mixing process will be conducted in the production area and is expected to involve 1 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 rotogravure machine at a rate of 6 g polymer/m². Daily polymer usage is anticipated to be 6-10 kg of notified chemical. Application will be conducted by 1-2 workers for up to 8 hours/day. Cleaning of the rotogravure machinery will be conducted once daily and will involve the removal of approximately 40 g of polymer from the roller. The application area is expected to be fitted with local exhaust ventilation.

Workers will be instructed to wear industrial clothing, eye protection and protective gloves during weighing, mixing and transfer operations, as well as product application, machinery maintenance and machinery cleaning.

7. PUBLIC EXPOSURE

There is negligible potential for public exposure to the notified chemical arising from leather treatment processes. There may be widespread public contact with the notified chemical 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 will be no release to the environment during transport and storage except in a major accident.

Minor spills and drips during leather treatment 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 and flocculation.

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.

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 disposed of.

The notified polymer is a water-reducible polymer. Water-reducible polymers generally contain pendant carboxylic acid groups along the polymer backbone. Although the polymer in carboxylic acid form is water insoluble, the pendant carboxylic acid groups can be neutralised with basic compounds such as triethylamine to produce water-soluble soaps of the polymer. The presence of the amine is critical to the water solubility of the polymer. Loss of amine, or insufficient amine, can lead to a decrease in solubility resulting in precipitation of the polymer from aqueous solution (1). Therefore, in the landfill as the solvents and triethylamine are lost from the polymer formulation, it is likely to become viscous and tacky and bind to the soil and eventually undergo slow microbial degradation.

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 (<1% added) is flocculated and desludged before discharge to the sewer. 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.

9. EVALUATION OF TOXICOLOGICAL DATA

No data were provided. Toxicological data are not required according to the Act for polymers with number-average molecular weight > 1000.

10. ASSESSMENT OF ENVIRONMENTAL EFFECTS

According to the Act, ecotoxicological testing is not required for polymers with NAMW > 1000 (3).

The notifier has provided the following data in the Material Safety Data Sheet (MSDS). Toxicity to fish (Golden orfe, *Leuciscus idus*): 96 h LC₅₀ > 500 mg/L. Toxicity to bacteria (Warburg test): >1000 mg/L. Note that reports to verify these results were not submitted.

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 0.2 kg of Astacin Ground UH daily. This results from cleaning of rotogravure machines at the end of the day and will be collected in a waste water treatment plant. With Astacin Ground UH containing 20% of the notified polymer, the total annual discharge of the polymer to the treatment plants of all 5 tanneries is estimated at < 80 kg. As most of this is retrapped 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, 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 water insoluble nature of the polymer. Incineration of such waste will destroy the polymer producing water and oxides of carbon and nitrogen.

Overall, the environmental hazards from the proposed import rates and use of the polymer are negligible.

12. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY EFFECTS

The notified polymer has number-average molecular weight > 1000 and is therefore unlikely to cross biological membranes and cause systemic effects. It contains no hazardous impurities at levels necessary to classify the polymer as a hazardous substance (total impurities ~ 1%) and low levels of low molecular weight species (1% with NAMW < 1000). 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 hazards associated with the polymer's toxicity and physico-chemical properties are therefore low.

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 chemical risks to workers and the public should be low.

13. RECOMMENDATIONS

To minimise occupational exposure to Polymer in Astacin Ground UH the following guidelines and precautions should be observed:

- Spillage of the notified chemical should be avoided.
- Good personal hygiene should be practised to minimise the potential for ingestion.
- A copy of the MSDS should be easily accessible to employees.

14. MATERIAL SAFETY DATA SHEET

The MSDS for Astacin Ground UH (containing the notified polymer) was provided in accordance with the *Code of Practice for the Preparation of Material Safety Data Sheets* (9).

This MSDS was provided by BASF Australia Ltd 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 BASF Australia Ltd.

15. REQUIREMENTS FOR SECONDARY NOTIFICATION

Under the *Industrial Chemicals (Notification and Assessment) Act 1989*, secondary notification of Polymer in Astacin Ground UH 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. Browning, S.B. 1983, *Surface Coatings Raw Materials and Their Use*. Vol 1, The New South Wales University Press, NSW, Australia. pp 263-293.

2. National Occupational Health and Safety Commission, 1994, *List of Designated Hazardous Substances*, Australian Government Publishing Service Publ., Canberra.
3. Nabholz, J.V., Miller, P., and Zeeman, M., 1993, 'Environmental Risk Assessment of New Substances under the Toxic Substances Control Act Section Five'. In W G Landis, J S Hughes and M A Lewis (Eds), *Environmental Toxicology and Risk Assessment*, American Society for Testing and Materials, ASTM STP 1179, Philadelphia. pp 40-55.
4. Standards Australia, 1994, *Australian Standard 1336-1994, Recommended Practices for Eye Protection in the Industrial Environment*, Standards Association of Australia Publ., Sydney, Australia.
5. Standards Australia, Standards New Zealand 1992, *Australian/ New Zealand Standard 1337-1992, Eye Protectors for Industrial Applications*, Standards Association of Australia Publ., Sydney, Australia, Standards Association of New Zealand Publ. Wellington, New Zealand.
6. Standards Australia, 1987, *Australian Standard 2919 - 1987 Industrial Clothing*, Standards Association of Australia Publ., Sydney, Australia.
7. Standards Australia, 1978, *Australian Standard 2161-1978, Industrial Safety Gloves and Mittens (excluding Electrical and Medical Gloves)*, Standards Association of Australia Publ., Sydney, Australia.
8. 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, Australia, Standards Association of New Zealand Publ. Wellington, New Zealand.
9. National Occupational Health and Safety Commission 1994, *National Code of Practice for the Preparation of Material Safety Data Sheets [NOHSC:2011(1994)]*, AGPS, Canberra.