File No: NA/292

Date: 21 March, 1996

NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME

FULL PUBLIC REPORT

CNSL Resin 158006

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Director
Chemicals Notification and Assessment

FULL PUBLIC REPORT

CNSL Resin 158006

1. APPLICANT

Huntsman Chemical Company Australia Ltd of Somerville Rd WEST FOOTSCRAY VICTORIA 3012 has submitted a limited notification statement accompanying their application for an assessment certificate for CNSL Resin 158006.

2. IDENTITY OF THE CHEMICAL

According to Worksafe Australia's *Approved Criteria for the Classifiying of Hazardous Substances* (1), CNSL Resin 158006 is considered harmful due to its potential skin and eye irritant and skin sensitising effects from the cashew nut shell liquid residual monomer, thereby classing it as a type 1 ingredient according to the National Model Regulations for the *Control of Workplace Hazardous Substances* (2). However, as it is the residual monomer and not the polymer which is hazardous chemical name, CAS number, molecular and structural formulae have been exempted from publication in the Full Public Report and the Summary Report.

Marketing name:	CNSL Resin 158006
Number-average molecular weight:	> 1000
Method of detection and determination:	the notified chemical may be identified by a combination of nuclear magnetic resonance spectrum, infrared spectrum and gel permeation chromatography (GPC)

3. PHYSICAL AND CHEMICAL PROPERTIES

Appearance at 20°C and 101.3 kPa:	black, moderately brittle, slightly rubbery solid
Odour:	not provided
Melting Point:	57-65°C
Specific Gravity:	1.0 at 25°C

Water Solubility:	< 1 g/L at 25°C
Reactivity/Stability:	non-exothermic self polymerisation at temperatures above 80°C with evolution of ammonia and trace formaldehyde possible
Flammability:	combustible

Comments on Physico-Chemical Properties

Hydrolysis was not determined but based on the known resistance of cashew nutshell liquids to acids and alkalis (Knop and Schleib, 1979) (3), hydrolysis under environmental conditions is not expected.

Partition coefficient is not expected to be relevant as the polymer is insoluble in water.

Adsorption/desorption was not carried out as the high molecular weight and insolubility would restrict movement of the polymer through the soil/sediment layers.

4. PURITY OF THE CHEMICAL

Degree of purity: >80%

Toxic impurity:

.	**Chemical name:**	cashew nutshell liquid monomer
	CAS No.:	8007-24-7
	Weight percentage:	12%
	Toxic properties:	toxic by ingestion, skin irritant, eye irritant, skin sensitiser.

5. INDUSTRIAL USE

CNSL Resin 158006 is intended to be used as a component in the manufacture of products used in friction applications. It will be imported in quantities greater than 100 tonnes per year.

6. OCCUPATIONAL EXPOSURE

The monomers are added to a reactor which is heated to affect polymerisation. Ammonia and trace formaldehyde produced during polymerisation is collected under negative pressure by a water scrubber on a vacuum pump. At the completion of the reaction the molten resin is discharged to cooling trays on the floor below the reactor and is allowed to cool under mechanical exhaust ventilation to remove residual ammonia or trace formaldehyde. The cooled resin slabs weighing 7 kg each are removed from the trays, sealed in polyethylene bags, packed in cardboard boxes

and shipped by road to the manufacturers of shaped products. This process is expected to involve 6 reactor operators and 2 cooling floor operators, both of whom are expected to have a potential exposure of 3 hours/week to the notified chemical, in addition to 2 technical leaders/supervisors who are potentially exposed for 1 hour/week.

At the end users' plants the notified polymer is weighed and combined with other materials in an enclosed high intensity mixer. The mixed material is automatically transferred to a milling operation to reduce it to particles approximately 4 mm in diameter which are manually put into a cold mould under high pressure. The cold formed product is manually transferred to a curing oven following which it is manually finished - ground, painted and branded. Up to 8 operators are expected to be potentially exposed to the notified chemical for 10 hours per week, as well as 3 managers who will potentially come into contact with the notified chemical for 2 hours per week.

7. PUBLIC EXPOSURE

The most likely exposure of the public to the notified polymer would be in the event of a transport accident involving spillage of the reacted slabs. Due to the slab form, public exposure to the polymer is unlikely to be significant.

The cured polymer in friction products such as brake linings should not present any acute exposure hazard. However, during use these products will generate dust, to which the public may be exposed in relatively minute concentrations.

8. ENVIRONMENTAL EXPOSURE

Release

There is a potential for release of the notified substance to the environment during the manufacture, transport, secondary processing and final use stages.

The manufacturing plant reactor and moulds and storage bins are cleaned down after each batch. Residues collected and not suitable for recycling will be heat cured to immobilise any free monomers and consigned to landfill. Approximately 1 tonne per annum may be consigned to landfill compounded and cured with other factory polymer wastes. Ammonia gas is a by-product of manufacture, scrubbers and filters are utilised to reduce the quantity in the exhaust to below VIC EPA licence requirements. Packaging of the solid blocks of polymer in plastic bags before enclosing in cartons minimises the potential for release during transport.

Fabrication of the final use products involves grinding of the notified substance to a smaller particle size and mixing with other components followed by a cold moulding and a curing process. Packaging and consignment to the end users then follows. Waste from the fabrication process would consist of floor sweepings and mould scrapings. These are consigned to landfill and may constitute approximately 0.5-3 tonne per annum of the cured notified substance.

In use the notified substance would be eventually ground to dust by friction of the wheels against the brake linings. This dust would fall to the ground, be widely dispersed and become part of the soil complex. Unconsumed portions of the brake pads would be consigned to landfill during regular maintenance of the vehicles rolling stock.

Fate

As the notified substance is a polymer with low water solubility, degradation in or leaching of the cured waste and final use product from landfill sites is not expected. Incineration of the notified substance is expected to produce oxides of carbon and nitrogen and some formaldehyde.

Most of the notified substance will be released to the environment in the form of dust particles generated during use of the brake pads; the small particles will become mixed with the soil in the vicinity of vehicle routes and are not expected to degrade or to migrate to deeper parts of the soil profile. Bioaccumulation in soil inhabiting organisms is unlikely due to the high molecular weight of the polymer.

9. EVALUATION OF TOXICOLOGICAL DATA

No toxicological data were provided for the notified polymer, which is acceptable for synthetic polymers with a number-average molecular weight (NAMW) > 1000 under the *Industrial Chemicals (Notification and Assessment) Act 1989 (the Act).*

The notifier states that there are no reported cases in the scientific literature of injuries or diseases related to the manufacture or use of cashew nutshell liquid polymers such as the notified polymer. However, commercial cashew nutshell liquid may occur as a significant portion (up to 12%) of the notified polymer. This monomer is a derivative of natural cashew nutshell liquid, which is a severe skin and eye irritant and a skin sensitiser, a weak genotoxin and a weak tumour promoter.

The health effects of chronic exposure to small amounts of cured polymer dust have not been determined.

10. ASSESSMENT OF ENVIRONMENTAL EFFECTS

No ecotoxicological data were provided, which is acceptable for polymers of NAMW > 1000 according to the Act.

The manufactured polymer in its uncured form may contain significant amounts of free monomer of the modified cashew nut shell liquid (cardanol). The submission states that this "commercial cashew nut shell liquid did not exhibit molluscicidal activity at 5 ppm". This monomer may be released on prolonged exposure of large quantities of the uncured polymer to water.

11. ASSESSMENT OF ENVIRONMENTAL HAZARD

The polymer is unlikely to present a hazard to the environment when it is manufactured fabricated used and consumed as a component in brake linings.

The polymer is also unlikely to present a hazard to aquatic organisms due to the curing of the polymer in the end-use application and the polymer's high molecular weight. In the uncured form the polymer may release the residual monomer contents on prolonged exposure to the environment. This is mitigated by the packaging of the uncured polymer slabs in plastic bags to slow release and enable recovery after a possible transport accident involving exposure of the load to water.

Environmental exposure arises from landfill disposal of a maximum of approximately 4 tonne per annum of cured factory waste containing the notified polymer. The waste would be deposited in landfills at Victorian sites and as it is expected to be stable and immobile in soil, environmental hazard is expected to be low.

The dust generated by use of the brake pads is non reactive and would form part of the non bioavailable organic debris in soils beside the vehicle routes. Due to the cured form of the polymer in the final use product loss of any monomer would be slow.

12. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY EFFECTS

The notified polymer has a NAMW > 1000 and is, therefore, unlikely to be able to cross biological membranes and cause systemic effects. However, there is a significant proportion of low molecular weight species (12% with NAMW < 500) likely to be mainly commercial cashew nutshell liquid monomer. This monomer is a derivative of natural cashew nutshell liquid which is known to be a skin sensitiser, a severe skin and eye irritant, a weak genotoxin and a weak tumour promoter. Solely on this basis the notified polymer would be classified as hazardous according to Worksafe Australia's *Approved Criteria for Classifying Hazardous Substances* (1) with respect to sensitising effects (skin) and irritant effects (skin, eye).

Monomers will be added to a reactor in which the production of the notified chemical will occur. The molten resin produced will be discharged into cooling trays to form slabs. During manufacture exposure to the notified chemical should be low as the reactor is enclosed. All workers involved in the initial manufacturing process of the notified chemical will be wearing as a minimum particulate filters, full face shields, PVC splash suits and PVC gloves, due to the hazardous nature of the monomer species used in production of the polymer. This will serve to minimise any exposure to the notified chemical. Dermal exposure to the notified polymer is possible when packing the cooled slabs into polyethylene bags All workers involved in this process are expected to wear protective goggles, impervious gloves and protective clothing. There is the possibility of residual ammonia being released from the molten resin during the cooling stage of manufacture in which case respiratory protection will be employed if the local exhaust ventilation proves to be inadequate.

During end use there is potential for dermal exposure during charging of the resin slabs to the high intensity mixer following which exposure is expected to be minimal. Operators will be protected from dust and fumes by a plant-wide dust and fume extraction system. As part of standard procedures, personnel will be expected to wear protective goggles, impervious gloves, and overalls. Respirators will be used if deemed necessary. Once cured in friction products exposure to the notified polymer is unlikely.

There is likely to be a risk of skin irritancy and sensitisation from handling the notified polymer after manufacture and during end use due to the content of low molecular weight species. There is unlikely to be a risk of adverse health effects to the public because of likely minimal exposure to the notified polymer.

13. RECOMMENDATIONS

To minimise occupational exposure to CNSL Resin 158006 the following guidelines and precautions should be observed:

- local exhaust ventilation should be implemented where there is the likelihood of exposure to dust or fumes.

- *Manufacturing*

  due to the hazardous nature of the monomer constituents, the following personal protective equipment as described in Australian (AS) or Australian/New Zealand (AS/NZS) should be worn during manufacture:

  - respiratory protection should be selected and used in accordance to AS/NZS 1715 (4) and should comply to AS/NZS 1716 (5).

  - full face shields and/or chemical goggles should be selected and fitted in accordance to AS 1336 (6) and meet the requirements of AS/NZS 1337 (7).

  - PVC splash suits must conform to the specifications detailed in AS 2919 (8) and AS 3765.1 (9).

  - impervious (PVC) gloves should conform to the standards detailed in AS 2161 (10) and AS 3765.1 (9).

- *Packaging and Moulding*

  if engineering controls and work practices are insufficient to reduce exposure to CNSL Resin 158006 to a safe level, then:

  - respiratory protection should be selected and used in accordance to AS/NZS 1715 (4) and should comply to AS/NZS 1716 (5).

  - eye protection should be selected and fitted in accordance to AS 1336 (6) and used in accordance to AS/NZS 1337 (7).

- industrial clothing must conform to the specifications detailed in AS 2919 (8).

- industrial gloves should conform to the standards detailed in AS 2161 (10).

- *Spillage*

  - personnel handling spillage should utilise the personnel protection for packaging and moulding procedures. Uncured waste should be collected and cured by heating in an approved heating chamber or disposed of by incineration according to local and state regulations. Cured waste may be disposed to landfill.

- storage of the notified chemical should be in a cool, dry ventilated area away from sources of strong heat or flame and strong oxidising agents.

- a copy of the Material Safety Data Sheet (MSDS) should be easily accessible to employees.

14. MATERIAL SAFETY DATA SHEET

The MSDS for CNSL Resin 158006 was provided in Worksafe Australia format (11).

This MSDS was provided by Huntsman Chemical Company Australia Ltd as part of their notification statement. The accuracy of this information remains the responsibility Huntsman Chemical Company Australia Ltd.

15. REQUIREMENTS FOR SECONDARY NOTIFICATION

Under the *Industrial Chemicals (Notification and Assessment) Act 1989*, secondary notification of CNSL Resin 158006 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, *Approved Criteria for Classifying Hazardous Substances [NOHSC:1008(1994)],* AGPS, Canberra.

2. National Occupational Health and Safety Commission, 1994, *Control of Workplace Hazardous Substances, National Model Regulations [NOHSC: 1005 (1994),* AGPS, Canberra.

3. Knop W and Schleib A., 1979. *Chemistry and Applications of Phenolic Resins- Properties and Applications*, Krinjer Verlag, Berlin.

4. Standards Australia, Standards New Zealand, 1994, *Australian/New Zealand Standard 1715 - 1994 Selection, Use and Maintenance of Respiratory Protective Devices*, Standards Association of Australia Publ., Sydney, Australia, Standards Association of New Zealand Publ., Wellington, New Zealand.

5. Standards Australia/ Standards New Zealand, 1991, *Australian/New Zealand Standard 1716 - 1991 Respiratory Protective Devices,* Standards Association of Australia Publ., Sydney, Australia.

6. Standards Australia , 1994, *Australian Standard 1336-1994, Recommended Practices for Eye Protection in the Industrial Environment.*, Standards Association of Australia Publ. Sydney, Australia.

7. 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.

8. Standards Australia, 1987, *Australian Standard 2919 - 1987 Industrial Clothing,* Standards Association of Australia Publ., Sydney, Australia.

9. Standards Australia, 1990, *Australian Standard 3765-1990 Clothing for Protection Against Chemical Hazards, Part 1 Protection Against General or Specific Chemicals, Part 2 Limited Protection Against Specific Chemicals,* Standards Association of Australia Publ., Sydney, Australia.

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

11. National Occupational Health and Safety Commission, 1994, *Guidance Note for the Completion of a Material Safety Data Sheet,* 2nd. edition, AGPS, Canberra.