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NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME

FULL PUBLIC REPORT

PHENOLIC RESIN PN 630

This Assessment has been compiled in accordance with the provisions of *the Industrial Chemicals (Notification and Assessment) Act 1989,* 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.

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Director
Chemicals Notification and Assessment

FULL PUBLIC REPORT

PHENOLIC RESIN PN 630

1. APPLICANT

BASF Australia Ltd of 500 Princes Hwy NOBLE PARK VICTORIA 3174 and Hoechst Australia Ltd of 606 St Kilda Rd MELBOURNE VICTORIA 3004 have submitted a limited notification statement accompanying their application for an assessment certificate for Phenolic Resin PN 630.

2. IDENTITY OF THE CHEMICAL

Phenolic Resin PN 630 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, exact import volume and exact formulation details have been exempted from publication in the Full Public Report and the Summary Report.

Phenolic Resin PN 630 contains a monomer which is a known skin sensitiser, is present at levels which would result in the notified polymer being classified as hazardous according to Worksafe Australia's *Approved Criteria for Classifying Hazardous Substances* (1) and should, therefore, be identified in public reports. However, for commercial reasons, the identity of the hazardous monomer has been granted exemption from publication in the Full Public Report and the Summary Report. The conditions of this being permitted are:

- A descriptive generic name be used to identify the substance in public reports and MSDS where its concentration exceeds 1% under any circumstances,
- The relevant employee unions shall be informed of the conditions of use of the polymer if monomer levels exceed 1% in dispersions containing the polymer,
- The full chemical name shall be provided to any health professionals in the case of a legitimate need where exposure to the chemical may involve a health risk,
- The full chemical name shall be provided to those on site who are using the chemical and to those who are involved in planning for safe use, etc. in the case of a legitimate need,
- The Director of NICNAS will release the full chemical name etc in the case of a request from a medical practitioner,
- Confidentiality will expire after a 3 year period,
- The chemical be identified as a sensitiser in the Health Effects section, and that reference to assessment by NICNAS be made on MSDS under circumstances where the level of the monomer exceeds 1%,
- These conditions shall be published in the Chemical Gazette.

Trade name:	Phenolic resin PN 630 (the notified polymer comprises < 20% of the aqueous dispersion to be imported which is also called Polyurethane Elastomer Dispersion for labelling purposes)
Number-average molecular weight:	1371
Weight-average molecular weight:	14429
Maximum percentage of low molecular weight species (molecular weight < 1000):	20%
Method of detection and determination:	IR spectroscopy

3. PHYSICAL AND CHEMICAL PROPERTIES

The notified polymer will be imported as a component of an aqueous dispersion and is never isolated. The properties listed below are those of either the dispersion or the notified polymer as indicated.

Appearance at 20°C and 101.3 kPa:	light, cream-coloured liquid (dispersion)
Odour:	slight acetone odour (dispersion)
Melting Point:	100-110°C (polymer)
Density:	1270 kg/m^3 (polymer) 1060 kg/m^3 (dispersion)
Vapour Pressure:	expected to be negligible (polymer). The dispersion is expected to have vapour pressure similar to water.
Water Solubility:	insoluble (polymer)
Autoignition Temperature:	based on similar aqueous dispersions expected to be > 200°C
Reactivity/Stability:	the aqueous dispersion is expected to be stable at ambient temperature and pressure and is not expected to burn - however, if the water evaporates and conditions for combustion prevail, the notified polymer is expected to burn with a smoky flame producing oxides of carbon, water vapour and incompletely burned hydrocarbons with the possibility of forming hazardous by-products.

Comments on physico-chemical properties

It is expected that fractions of higher molecular weight/larger molecular size will be less water soluble than the low molecular weight portion of the notified polymer. The solubility of the low molecular weight portion of the polymer (MW < 500) in water was found to be below 0.15%. However, the overall water solubility of the notified polymer in water is expected to be low due to its high molecular weight and structure. The dispersion is miscible with water.

Hydrolysis of the notified polymer will be limited as it is expected to have low solubility in water and it contains no hydrolysable groups.

The partition coefficient, adsorption/desorption and the dissociation constant are difficult to measure due to the limited water solubility and surface active properties. The partition coefficient is expected to be high; therefore, strong adsorption and limited desorption is expected. The weakly acidic phenol groups are expected to have a typical dissociation constant. At more alkaline conditions the water solubility of the polymer could be enhanced.

4. PURITY OF THE CHEMICAL

Degree of purity: 92.8%

Toxic or hazardous impurities:

Chemical Name	*Relevant Toxic Properties*	*Wt %*
Substituted phenol	moderately toxic by ingestion and dermal contact; severe eye irritant; skin irritant; human skin sensitiser.	4.8%
Impurity 2	mildly toxic by ingestion or inhalation; experimental teratogen; experimental reproductive effects	2%
Impurity 3	poison by ingestion; moderate dermal toxicity; experimental tumourigen; corrosive irritant to skin, eyes and mucous membranes; can cause pulmonary oedema	0.2%

Non-toxic impurities (> 1% by weight): None

Additives/Adjuvants: None

5. USE, VOLUME AND FORMULATION

The notified polymer is a component of a water-based contact adhesive. It will be imported as a component (at a level of < 20%) of an aqueous dispersion in 120 L open head polyethylene drums at a rate of < 10 tonnes per year for the first five years.

6. OCCUPATIONAL EXPOSURE

The notified chemical will be transported by road to the notifier's warehouse in a shipping container. As required the individual drums will be transported to a single customer. Up to 12 drivers and 6 storepersons would be involved and exposure is unlikely except in the event of an accident.

In the manufacture of the adhesive, the polymer dispersion is pumped from the drums into a weighing vessel. Once the correct weight has been achieved the dispersion is automatically pumped into the mixing vessel where it is mixed with an acrylic emulsion, wetting agent and thickener. The final concentration of the notified polymer in the finished adhesive is < 10%. The mixing vessel has a batch size of approximately 1000 kg and is fitted with local exhaust ventilation. When mixing is complete, the adhesive is drummed off into 200 kg open head steel or plastic drums.

A maximum of 6 blenders/process operators and 4 laboratory personnel would be potentially exposed to the adhesive during production. The duration of exposure is expected to vary from a few minutes to 8 hours on one day per week.

Exposure to the polymer dispersion is possible through incidental splashing during the weighing out and drumming off stages of the process. Some minor exposure may occur during testing samples for quality control and during maintenance of equipment.

A single customer will use the adhesive to fix foil-faced insulation onto powder-coated galvanised steel air conditioning cabinets. This involves 12 operators spraying the adhesive onto the pre-cut insulation and into the cabinet in spray booths fitted with local exhaust ventilation. The spray gun is attached to the drum of adhesive by a line connected to a drum spear.

The main exposure potential for the notified polymer during use of the adhesive containing it would appear to be from residue on the drum spear. The duration of exposure during spraying of the adhesive is calculated at 23 minutes per day.

7. PUBLIC EXPOSURE

The chemical will be used only at one formulation plant and one end-user facility where procedures to minimise public exposure to solvent-based chemicals are well established. The potential for minor public exposure to the chemical exists during transport and disposal of process wastes and clean-up wastes if the chemical is accidentally spilt. There would appear to be no likely public exposure from the end-use application of the chemical in a water-based contact adhesive in one manufacturing plant.

8. ENVIRONMENTAL EXPOSURE

. Release

Releases containing the notified polymer will be mainly limited to washings from the formulation and application processes of the adhesive. It is expected that much less than 1% of the notified polymer will be discharged to waste water streams during its formulation. Waste water from the formulation plant is collected and discharged to an onsite trade waste treatment plant. Effluent from this process is then treated.

Information regarding waste waters from the end-use site is not included in the notification; however, the amount of the notified polymer released is expected to be small and the potential for loss low. It is assumed that the effluent will be sent for treatment at a municipal waste water treatment plant.

Emptied drums at the adhesive formulation plant are rinsed out with water and recycled. The wash water from such cleanings will become part of the effluent of the plant and be sent for treatment. Emptied drums and waste cabinets from the end-use site are crushed and included with other industrial waste for pick up and disposal by contractor to an approved landfill. This amount of waste has been estimated by the applicant to be a maximum of 1% of the usage.

As the polymer should not become airborne during formulation processes, filters from the exhaust ventilation systems will contain only limited amounts of the polymer. These filters will either be disposed of to landfill or cleaned, where waste waters will become part of the effluent of the plant.

Exposure during transportation will result only in the event of accidental spill or mishandling.

. Fate

The fate of the polymer is either to be bound to articles or disposed of by landfill/incineration.

The majority of the notified chemical will be part of the adhesive that is applied to articles used in the manufacture of air conditioning cabinets. In its final form the polymer will be a part of a cross-linked hardened adhesive. Articles that have had the adhesive applied would eventually be disposed of to landfill or recycled by metal smelting. The expected insoluble nature of the cured polymer will ensure any hydrolysis or breakdown to occur at an extremely low rate, if at all.

Disposal of the polymer to the sewer is expected to see the polymer partition to the sludge and be trapped in the solids at the sewage treatment works. The solids are disposed of by landfill or incineration.

Disposal of the notified polymer to landfill is unlikely to result in contamination of surface and ground waters. Its low water solubility and expected high log P_{ow} indicates it is unlikely to leach. Incineration of the substance in excess air will result in oxides of carbon, and water vapour.

Fully flushed containers are likely to be treated as industrial waste and may possibly be recycled.

9. EVALUATION OF TOXICOLOGICAL DATA

Toxicological data are not required for polymers of number-average molecular weight (NAMW) > 1000 according to the *Industrial Chemicals (Notification and Assessment) Act, 1989* (the Act) and no data were submitted for the notified polymer.

10. ASSESSMENT OF ENVIRONMENTAL EFFECTS

The notifier has not presented any ecotoxicity results for the polymer. Ecotoxicity tests are not required for a polymer with NAMW > 1000 according to the Act.

However it is noted that in the MSDS for the polymer dispersion a 96hr LC_{50} of 2200 mg /L for the fish species *Golden orfe* is quoted. This indicates that the polymer dispersion is practically non-toxic to fish. The data probably reflect the physical effects of the dispersion rather than any toxic effects as the polymer has a large molecular size and is not expected to cross biological membranes.

The polymer is not expected to show ecotoxicity effects as it should not cross membranes and belongs to a class of polymers recognised as being of low concern (2).

11. ASSESSMENT OF ENVIRONMENTAL HAZARD

The notified polymer will be formulated into an adhesive product by one company. The adhesive will then only be used by one company in their manufacture of air conditioning cabinets. Release of the polymer to the environment as a result of this proposed use is considered to be minimal.

The waste water discharged during formulation of the adhesive is expected to contain much less than 1% of the notified polymer. After treatment involving 250 ML/day, the resulting concentration of the notified polymer in the effluent will be approximately 1 ppb. This assumes no adsorption of the polymer to the sludge (strong adsorption to sludge is expected) and does not take into account the mixing of the effluent in receiving waters. Consequently the concentration of the polymer in receiving waters will be significantly less.

It is expected that waste water from the end-use site will be treated by a municipal waste water treatment plant. As the expected amount of polymer waste sent for treatment is expected to be similar to that of above, i.e. < 1% of the notified polymer, its concentration in receiving waters is expected to be of similar order of magnitude as calculated above. The solids from waste treatment processes are disposed of by landfill or incineration.

As the chemical waste trapped in the exhaust ventilation filters is expected to dry out and cure before disposal, the hazard from this material is expected to be negligible when it is landfilled or incinerated. Any droplets not trapped by the exhaust ventilation filters will dry out and polymerise to an inert particle.

As the polymer is expected to be insoluble in water, the polymer waste consigned to landfill is unlikely to leach and will remain in the landfill. It is unlikely that the polymer

could hydrolyse due to the low solubility in water and the lack of hydrolysable groups. The environmental hazard from the disposal of waste containing the polymer is rated as low.

Complete incineration of the polymer will generate oxides of carbon, and water vapour. The environmental hazard can be rated as negligible.

The overall environmental hazard from the use of the chemical is rated as low.

12. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY EFFECTS

The notified polymer has a NAMW greater than 1000 and should not be able to be absorbed across biological membranes to cause systemic effects. The levels of low molecular weight species (20% with NAMW < 1000) and residual monomers would render the polymer hazardous according to the criteria of Worksafe Australia (1) because of the potential for skin sensitisation. However, if the low molecular weight species and residual monomers became evenly dispersed by leaching throughout the imported formulation the resultant concentrations would not render the polymer dispersion hazardous according to Worksafe criteria.

During formulation of the adhesive containing the notified polymer, exposure to the aqueous dispersion containing the polymer is possible during its addition to a mixing vessel and during drumming off of the finished adhesive. Exposure is possible from incidental splashing and cleaning up of spills. Such exposure is limited to a certain extent by the fact that adhesive is prepared on one day per week and also by the relatively low concentration of the notified polymer in the aqueous dispersion (< 20%). Exposure during maintenance and quality control is expected to be low.

During use of the adhesive to bond insulation to air conditioning cabinets, exposure is expected to be low through the use of ventilated spray booths. Spraying of the adhesive should result in minimal exposure to the notified polymer. In addition the duration of exposure is calculated at 23 minutes per day. Exposure to the adhesive is possible from drips and spills caused by inserting and removing a drum spear attached to the spray gun. Such exposure could be long term if adhesive bonds to the skin.

The risk of adverse health effects arising from exposure to the notified polymer is expected to be low given its low hazard and low concentration in the aqueous dispersion to be imported together with limited opportunity for exposure. However, there may be a risk of skin sensitisation in some individuals from exposure to low molecular weight species (NAMW < 500) in the polymer.

13. RECOMMENDATIONS

To minimise occupational exposure to Phenolic Resin PN 630 the following guidelines and precautions should be observed:

. If engineering controls and work practices are insufficient to reduce exposure to a safe level, then the following personal protective devices should be worn:

  - eye protection should be selected and fitted in accordance to AS 1336 (3) and meet the requirements of AS/NZS 1337 (4);

  - impermeable gloves should conform to AS 2161 (5);

  - protective clothing should conform to AS 2919 (6);

  - protective footwear should conform to AS/NZS 2210 (7).

. Good work practices should be implemented to avoid spillages and splashing;

. Good housekeeping and maintenance should be practised. Spillages should be cleaned up promptly with absorbents which should then be put into containers for disposal in accordance with Local or State government regulations;

. Good personal hygiene should be observed; and

. A copy of the relevant Material Safety Data Sheet(s) (MSDS) should be easily accessible to employees.

14. MATERIAL SAFETY DATA SHEET

The MSDS for Phenolic Resin PN 630 and the aqueous dispersion containing it were provided in accordance with Worksafe Australia's *National Code of Practice for the Preparation of Material Safety Data Sheets* (8).

These MSDS were provided by the applicants as part of their notification statement. They are reproduced here as a matter of public record. The accuracy of this information remains the responsibility of the applicants.

15. REQUIREMENTS FOR SECONDARY NOTIFICATION

Under the *Industrial Chemicals (Notification and Assessment) Act 1989*, secondary notification of Phenolic Resin PN 630 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)]*, Australia Government Publishing Service, Canberra, Australia.

2. Nabholz J V, Miller P and Zeeman M 'Environmental Risk Assessment of New Chemicals Under the Toxic Substances Control Act TSCA Section Five', in *Environmental Toxicology and Risk Assessment*, W G Landis, J S Hughes and M A Lewis (Eds), pp 40-55.

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

4. 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.

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

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

7. 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.

8. National Occupational Health and Safety Commission 1994, *National Code of Practice for the Preparation of Material Safety Data Sheets [NOHSC:2011(1994)]*, AGPS, Canberra, Australia.