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**NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME
(NICNAS)**

PUBLIC REPORT

Polymer in THIXON OSN-2-EF

This Assessment has been compiled in accordance with the provisions of the *Industrial Chemicals (Notification and Assessment) Act 1989* (Cwlth) (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 the Department of Health, and conducts the risk assessment for public health and occupational health and safety. The assessment of environmental risk is conducted by the Department of the Environment.

For the purposes of subsection 78(1) of the Act, this Public Report may be inspected at our NICNAS office by appointment only at Level 7, 260 Elizabeth Street, Surry Hills NSW 2010.

This Public Report is also available for viewing and downloading from the NICNAS website or available on request, free of charge, by contacting NICNAS. For requests and enquiries please contact the NICNAS Administration Coordinator at:

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**Director
NICNAS**

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SUMMARY

The following details will be published in the NICNAS *Chemical Gazette*:

ASSESSMENT REFERENCE	APPLICANT(S)	CHEMICAL OR TRADE NAME	HAZARDOUS CHEMICAL	INTRODUCTION VOLUME	USE
LTD/1685	Dow Chemical (Australia) Limited Rebain International (Aust) Pty Ltd Rohm and Haas Australia Pty. Ltd	Polymer in THIXON OSN-2-EF	ND*	≤ 4 tonne/s per annum	A component of adhesives

*ND = not determined

CONCLUSIONS AND REGULATORY OBLIGATIONS

Hazard classification

As no toxicity data were provided, the notified polymer cannot be classified according to the *Globally Harmonised System for the Classification and Labelling of Chemicals* (GHS), as adopted for industrial chemicals in Australia, or the *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 2004).

Human health risk assessment

Under the conditions of the occupational settings described, the notified polymer is not considered to pose an unreasonable risk to the health of workers.

When used in the proposed manner, the notified polymer is not considered to pose an unreasonable risk to public health.

Environmental risk assessment

On the basis of the assessed use pattern, the notified polymer is not considered to pose an unreasonable short-term risk to the environment. However, due to the potential release of possibly persistent and/or bioaccumulative highly halogenated fragments, the long-term environmental implications are unknown.

Recommendations

CONTROL MEASURES

Occupational Health and Safety

- A person conducting a business or undertaking at a workplace should implement the following engineering controls to minimise occupational exposure to the notified polymer:
 - Ventilation system including local exhaust ventilation.
 - Automated and enclosed processes, where possible.
 - Use of spray booths during spray application, where possible.
- A person conducting a business or undertaking at a workplace should implement the following safe work practices to minimise occupational exposure during handling of the notified polymer:
 - Avoid contact with eyes and skin.
- A person conducting a business or undertaking at a workplace should ensure that the following personal protective equipment is used by workers to minimise occupational exposure to the notified polymer:
 - Eye and face protection
 - Impervious coveralls

- Impervious gloves
- Impervious footwear
- Respiratory protection, if inhalation exposure may occur.

Guidance in selection of personal protective equipment can be obtained from Australian, Australian/New Zealand or other approved standards.

- Spray applications should be carried out in accordance with the Safe Work Australia Code of Practice for *Spray Painting and Powder Coating* (SWA, 2012) or relevant State or Territory Code of Practice.
- A copy of the (M)SDS should be easily accessible to employees.
- If products and mixtures containing the notified polymer are classified as hazardous to health in accordance with the *Globally Harmonised System for the Classification and Labelling of Chemicals (GHS)* as adopted for industrial chemicals in Australia, workplace practices and control procedures consistent with provisions of State and Territory hazardous substances legislation should be in operation.

Disposal

- The notified polymer should be disposed of to landfill.

Emergency procedures

- Spills or accidental release of the notified polymer should be handled by physical containment, collection and subsequent safe disposal.

Regulatory Obligations

Secondary Notification

This risk assessment is based on the information available at the time of notification. The Director may call for the reassessment of the chemical under secondary notification provisions based on changes in certain circumstances. Under Section 64 of the *Industrial Chemicals (Notification and Assessment) Act (1989)* the notifier, as well as any other importer or manufacturer of the notified chemical, have post-assessment regulatory obligations to notify NICNAS when any of these circumstances change. These obligations apply even when the notified polymer is listed on the Australian Inventory of Chemical Substances (AICS).

Therefore, the Director of NICNAS must be notified in writing within 28 days by the notifier, other importer or manufacturer:

- (1) Under Section 64(1) of the Act; if
 - the polymer has a number-average molecular weight of less than 1000;or
- (2) Under Section 64(2) of the Act; if
 - the function or use of the polymer has changed from a component of adhesives used in industrial settings, or is likely to change significantly;
 - the amount of polymer being introduced has increased, or is likely to increase, significantly;
 - the polymer has begun to be manufactured in Australia;
 - additional information has become available to the person as to an adverse effect of the polymer on occupational health and safety, public health, or the environment.

The Director will then decide whether a reassessment (i.e. a secondary notification and assessment) is required.

(Material) Safety Data Sheet

The (M)SDS of a product containing the notified polymer provided by the notifier was reviewed by NICNAS. The accuracy of the information on the (M)SDS remains the responsibility of the applicant.

ASSESSMENT DETAILS

1. APPLICANT AND NOTIFICATION DETAILS

APPLICANT(S)

Dow Chemical (Australia) Limited (ABN: 72 000 264 979)
541-583 Kororoit Creek Road, ALTONA VIC 3018

Rebain International (Aust) Pty Ltd (ABN: 50 102 669 536)
53-55 Rodeo Drive, DANDENONG VIC 3175

Rohm and Haas Australia Pty. Ltd (ABN: 29 004 513 188)
4th Floor, 969 Burke Road, CAMBERWELL VIC 3124

NOTIFICATION CATEGORY

Limited: Synthetic polymer with Mn \geq 1000 Da.

EXEMPT INFORMATION (SECTION 75 OF THE ACT)

Data items and details claimed exempt from publication: chemical name, other names, CAS number, molecular and structural formulae, molecular weight, analytical data, degree of purity, polymer constituents, residual monomers, impurities and import volume.

VARIATION OF DATA REQUIREMENTS (SECTION 24 OF THE ACT)

Variation to the schedule of data requirements is claimed as follows: all physico-chemical endpoints.

PREVIOUS NOTIFICATION IN AUSTRALIA BY APPLICANT(S)

None

NOTIFICATION IN OTHER COUNTRIES

None

2. IDENTITY OF CHEMICAL

MARKETING NAME(S)

THIXON OSN-2-EF (product containing the notified polymer at < 25%).

MOLECULAR WEIGHT

> 70,000 Da

ANALYTICAL DATA

Reference NMR, IR and SEC spectra were provided.

3. COMPOSITION

DEGREE OF PURITY

> 98%

HAZARDOUS IMPURITIES/RESIDUAL MONOMERS

There is one impurity present at a concentration where it would be classified under the *Globally Harmonised System for the Classification and Labelling of Chemicals (GHS)*, as H331 – Toxic if inhaled, and under the *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 2004) as R20: Harmful by inhalation.

4. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE AT 20 °C AND 101.3 kPa: Black liquid *

Property	Value	Data Source/Justification
Melting Point/Freezing Point	Not determined	The notified polymer is imported in a liquid mixture.
Boiling Point	Not determined	Due to its high molecular weight the

Density	950 kg/m ³ *	notified polymer is expected to decompose prior to boiling.
Vapour Pressure	< 1.3 × 10 ⁻⁹ kPa	(M)SDS
Water Solubility	Not determined	Estimated based on the NAMW > 1,000 Da (US EPA, 2013)
Hydrolysis as a Function of pH		The notified polymer has very high molecular weight and is not expected to have significant water solubility.
Partition Coefficient (n-octanol/water)	Not determined	Does not contain hydrolysable functionalities.
Adsorption/Desorption	Not determined	The notified polymer is expected to partition to n-octanol based on its expected low water solubility.
Dissociation Constant	Not determined	The notified polymer is a non-ionic polymer and has a high molecular weight; hence, a significant portion of the notified polymer is expected to partition to soils/sludge.
Flash Point	-4 °C *	Does not contain dissociable functionalities.
Autoignition Temperature	Not determined	(M)SDS.
Explosive Properties	Not expected to be explosive	Not expected to autoignite under normal conditions of use.
Oxidising Properties	Not determined	The structural formula contains no explosives.
		The notified polymer contains no functional groups that would imply oxidative properties.

* For the introduced mixture containing the notified polymer at a concentration < 25%.

DISCUSSION OF PROPERTIES

Reactivity

The notified polymer is expected to be stable under normal conditions of use.

Physical hazard classification

Based on the submitted physico-chemical data depicted in the above table, the notified polymer is not recommended for hazard classification according to the *Globally Harmonised System for the Classification and Labelling of Chemicals (GHS)*, as adopted for industrial chemicals in Australia.

5. INTRODUCTION AND USE INFORMATION

MODE OF INTRODUCTION OF NOTIFIED CHEMICAL (100%) OVER NEXT 5 YEARS

The notified polymer will not be manufactured in Australia. The notified polymer will be imported as a component of THIXON OSN-2-EF at a concentration of < 25%.

MAXIMUM INTRODUCTION VOLUME OF NOTIFIED CHEMICAL (100%) OVER NEXT 5 YEARS

<i>Year</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>
<i>Tonnes</i>	1-4	1-4	1-4	1-4	1-4

PORT OF ENTRY

Melbourne

TRANSPORTATION AND PACKAGING

The product containing the notified polymer at < 25% will be imported in 20 kg steel drums. The notified polymer will be transported to end use sites by road.

USE

The notified polymer will be used as a component of a one-coat solvent-based adhesive, at concentrations < 25%, for use in bonding various substrates, such as rubber elastomers to metals, for original equipment manufacture (OEM).

OPERATION DESCRIPTION

The notified polymer will not be manufactured within Australia. Imported adhesives containing the notified polymer will be reformulated and used in industrial settings for OEM manufacture only and not by tradesmen or the public.

The adhesive product containing the notified polymer at concentrations < 25% will be used for bonding rubber to metal. The adhesive product may be diluted with solvent prior to use to adjust the viscosity. The adhesive containing the notified polymer will be applied by spray, dipping and brush.

When the adhesive is applied by spray it will be manually added to the reservoir tank for the spray equipment. If dilution is required, mixing will be carried out in a bucket, and the diluted adhesive added to the reservoir tank for the spray equipment. Spray application is expected to be conducted using robotic sprayers in a spray booth, and the adhesive will be left to dry to a film prior to the removal of the components it was applied to.

When the adhesive is applied by dipping, components will be carried on an overhead conveyer where they are dipped into a tank containing the adhesive which is then allowed to dry. The dipping process is expected to be automated and enclosed. When the adhesive is applied by brush, local exhaust ventilation is expected to be used.

To bond the rubber to the metal components after they have coated with the adhesive and it has dried they will be brought together and heated in a curing oven where fume extraction is present.

6. HUMAN HEALTH IMPLICATIONS

6.1. Exposure Assessment

6.1.1. Occupational Exposure

CATEGORY OF WORKERS

<i>Category of Worker</i>	<i>Exposure Duration (hours/day)</i>	<i>Exposure Frequency (days/year)</i>
Transport and storage	2-4	24
OEM plant operators	0.25	50-100
Maintenance	1-2	12

EXPOSURE DETAILS

It is anticipated that transport and warehouse/store personnel would only be exposed to the notified polymer at < 25% concentration in the event of an accident.

Dermal and ocular exposure to the notified polymer at < 25% concentration by plant workers may occur during dilution of the adhesive products, transfer of the adhesive to the dipping or spray equipment and maintenance of this equipment or during manual application of the adhesive by brush. Exposure will be limited by the use of personal protective equipment (PPE) including gloves, safety glasses and protective clothing. It is expected that there will be a low potential for exposure during the automated and enclosed spraying or dipping processes.

Spray application is proposed to only occur in a designated spray booth or equivalent setting where inhalation exposure is not expected. However, respiratory protection should be worn by workers if spraying does occur where inhalation exposure is possible. Inhalation exposure from dipping or brushing application is expected to be negligible given the low estimated vapour pressure of the notified polymer and the use local exhaust ventilation.

Workers may be exposed to articles that have had adhesive containing the notified polymer applied to them, however, after curing the notified polymer will be bound within a polymer matrix and will not be bioavailable.

6.1.2. Public Exposure

The notified polymer is intended for industrial use only, and will not be available to the public. Direct exposure would therefore not be expected.

Members of the public may be exposed to articles that have had adhesive containing the notified polymer applied to them, however, after curing the notified polymer will be bound within a polymer matrix and will not be bioavailable.

6.2. Human Health Effects Assessment

No toxicity data were submitted for the notified polymer.

Toxicokinetics, metabolism and distribution.

Based on its high molecular weight ($> 70,000$ Da), the potential of the notified polymer to cross the gastrointestinal (GI) tract by passive diffusion, or to be dermally absorbed after exposure is expected to be limited. However, the notified polymer has high polydispersity with a small percentage of low molecular weight species ($< 10\%$) that are below $1,000$ Da. This fraction is expected to more readily cross biological membranes of the GI tract and skin.

Toxicity

The notified polymer contains a monomer which is corrosive and very toxic by inhalation, toxic in contact with skin and harmful if swallowed (SIDS, 2007), and which is likely to still retain some reactive functionality within the uncured notified polymer. Due to high average molecular weight ($> 70,000$ Da), the notified polymer is not expected to readily cross biological membranes and hence limit systemic toxicity. However, a small percentage ($< 10\%$) of low molecular weight species ($< 1,000$ Da) present may contribute to some toxicity and thus, adverse systemic effects from exposure to the polymer cannot be ruled out. Similarly, although the irritancy of the notified polymer is expected to be significantly less than the monomer due to some of the reactive functional groups in the monomer being utilised in the synthesis of the notified polymer and its much higher molecular weight, the potential for irritation cannot be ruled out.

In addition to potential toxicity related to a constituent monomer and low molecular weight species, the notified polymer also has a lung overloading hazard. Inhalation of respirable particles of polymers with molecular weights $> 70,000$ Da has been linked with irreversible lung damage due to lung overloading and impaired clearance of particles from the lung, particularly following repeated exposure (US EPA, 2013). As the notified polymer has a high average molecular weight ($> 70,000$ Da) and is relatively water insoluble, the risk from lung overloading with repeated inhalation exposure cannot be ruled out.

Health hazard classification

As no toxicity data were provided, the notified polymer cannot be classified according to the *Globally Harmonised System for the Classification and Labelling of Chemicals (GHS)*, as adopted for industrial chemicals in Australia, or the *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 2004).

6.3. Human Health Risk Characterisation

6.3.1. Occupational Health and Safety

Given the limited information available, the notified polymer may have the potential for some skin and eye irritation, inhalation and/or general systemic toxicity (based on the presence of low molecular weight species and a hazardous constituent monomer), however, the extent of toxicity is unknown and is expected to be significantly less than for the hazardous monomer alone. In addition, lung overloading effects are possible (based on the presence of high molecular weight, insoluble species) but are not expected under the proposed use scenario.

The polymer will only be used in industrial settings for OEM manufacture. During use of adhesive products, plant workers may have accidental dermal or ocular exposure to the notified polymer at concentrations of $< 25\%$, however exposure is expected to be minimised by the use of appropriate PPE and largely enclosed, automated processes. While the notified polymer may present an inhalation hazard when sprayed, all spray application is expected to be conducted in designated spray booths where inhalation of the polymer is not possible. If inhalation exposure during spray application is possible, respiratory protection is expected to be worn.

Workers will handle articles that have had adhesive containing the notified polymer applied to them, however, after curing the notified polymer will be bound within a polymer matrix and will not be bioavailable.

Therefore, providing contact with the notified polymer is avoided by the use of appropriate PPE and ensuring engineering controls are in place, the risk to workers from the use of the notified polymer is not considered to be unreasonable.

6.3.2. Public Health

The notified polymer is intended to be used in industrial settings only. Articles that have had adhesive containing the notified polymer applied to them may be available to the public, however, after curing the notified polymer will be bound within a polymer matrix and will not be bioavailable. Therefore, based on the low exposure potential, the risk to the public is not considered to be unreasonable.

7. ENVIRONMENTAL IMPLICATIONS

7.1. Environmental Exposure & Fate Assessment

7.1.1. Environmental Exposure

RELEASE OF CHEMICAL AT SITE

The notified polymer is not manufactured or reformulated in Australia; therefore, the release of the notified polymer to the environment is not expected from these activities.

RELEASE OF CHEMICAL FROM USE

Release of the notified polymer to sewer or the aquatic environment is not expected during use. Equipment and empty import containers are expected to be cleaned with a suitable solvent. The washings are expected to be collected and disposed of into the solvent recycling stream. The solvent waste is expected to be collected by a licensed waste contractor. The release from overspray during use is anticipated to be collected via a forced air fume collection system attached to the spray booths. The notified polymer in collected overspray (approximately 20% of the total import volume) is expected to be recycled into the next batch. The adhesive is also likely to be applied by brush and dipping. The notified polymer (up to 4% of the total import volume) is expected to be disposed of to landfill as wastes from end use.

RELEASE OF CHEMICAL FROM DISPOSAL

Release of the notified polymer to sewer or the aquatic environment is not expected. Articles containing the notified polymer are expected to be disposed of to landfill or subjected to metal recycling at the end of their useful lives.

7.1.2. Environmental Fate

No environmental fate data were submitted. The majority of introduced notified polymer is expected to be cured into the adhesive matrix and bonded to the rubber/metal substrate. The notified polymer will share the fate of the coated articles. Metal substrates are likely to be recycled by smelting, and the notified polymer is expected to be destroyed during this process. The notified polymer is expected to be tightly bound to the rubber articles and, in this form, is not expected to be bioavailable or biodegradable. The notified polymer in solid wastes disposed of to landfill is not expected to be mobile due to its high molecular weight and is not expected to be released to the aquatic environment according to the assessed use pattern. The potential for bioaccumulation of the notified polymer is low due to its high molecular weight and its limited release to surface waters. It will eventually degrade by biotic and abiotic mechanisms to form water and oxides of carbon. The notified polymer also contains functionality that, over extended periods of time, may eventually degrade to form potentially persistent and/or bioaccumulative highly halogenated fragments.

7.1.3. Predicted Environmental Concentration (PEC)

The predicted environmental concentration (PEC) has not been calculated for the notified polymer as, based on its reported use pattern, ecotoxicologically significant quantities are not expected to be released to the aquatic environment.

7.2. Environmental Effects Assessment

No ecotoxicity data were submitted. Since the notified polymer is a non-ionic polymer, it is not likely to be hazardous to the environment, and is generally of low concern to the aquatic environment. Furthermore, the majority of the notified polymer applied to rubber/metal substrates will be cured into the adhesive matrix and is not expected to be bioavailable.

7.2.1. Predicted No-Effect Concentration

A Predicted No-Effect Concentration (PNEC) was not calculated as no ecotoxicological data were submitted and there will be very low potential for aquatic exposure.

7.3. Environmental Risk Assessment

A Risk Quotient ($RQ = PEC/PNEC$) is unable to be quantified as a PEC and PNEC were not calculated. There is no significant aquatic release of the notified polymer anticipated based on the reported use pattern. Moreover, after curing, the majority of the imported quantity of notified polymer will be incorporated into the adhesive matrix and is not expected to be mobile, bioavailable nor readily biodegradable. The notified polymer contains functionality that may slowly degrade over extended periods of time to form potentially persistent and/or bioaccumulative highly halogenated fragments. However, based on the incorporation of the notified polymer into the adhesive matrix and the expected limited environmental exposure and mobility of the articles formed using the notified polymer, the potential release of highly hydrogenated fragments is expected to be limited. On the basis of the assessed use pattern, the notified polymer is not considered to pose an unreasonable short-term risk to the environment. However, due to the potential release of possibly persistent and/or bioaccumulative highly halogenated fragments, the long-term environmental implications are unknown.

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