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NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME (NICNAS)

FULL PUBLIC REPORT

Polymer in DESMOLUX™ XP 2491

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 Ageing, 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 and Water Resources.

For the purposes of subsection 78(1) of the Act, this Full Public Report may be inspected at our NICNAS office by appointment only at 334-336 Illawarra Road, Marrickville NSW 2204.

This Full 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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FULL PUBLIC REPORT

Polymer in DESMOLUX™ XP 2491

1. APPLICANT AND NOTIFICATION DETAILS

APPLICANT(S)
Bayer Australia Limited (Bayer MaterialScience) ABN: 22 000 138 714
500 Wellington Road
Mulgrave North
VIC 3170

NOTIFICATION CATEGORY
Limited: Polymer with NAMW ≥ 1000 (greater than 1 tonne per year).

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
Polymer Constituents
Residual Monomers/Impurities
Spectral Data
Use Details
Manufacture/Import Volume
Site of Manufacture/Reformulation

VARIATION OF DATA REQUIREMENTS (SECTION 24 OF THE ACT)
Variation to the schedule of data requirements is claimed as follows:
Boiling point
Density
Vapour pressure
Water solubility
Hydrolysis as a Function of pH
Partition Co-efficient
Absorption/Desorption
Dissociation Constant
Particle Size
Flash Point
Flammability Limits
Autoignition Temperature
Explosive Properties
Reactivity

PREVIOUS NOTIFICATION IN AUSTRALIA BY APPLICANT(S)
None

NOTIFICATION IN OTHER COUNTRIES
None

2. IDENTITY OF CHEMICAL

MARKETING NAME(S)

Polymer in DESMOLUX™ XP 2491

METHODS OF DETECTION AND DETERMINATION

Remarks IR, UV-Visible and NMR Spectra were provided.

3. COMPOSITION

DEGREE OF PURITY
>95%

DEGRADATION PRODUCTS
Thermal decomposition products include: carbon dioxide, carbon monoxide and oxides of nitrogen.

LOSS OF MONOMERS, OTHER REACTANTS, ADDITIVES, IMPURITIES
The residual monomers may be lost to the environment when the polymer or product containing it is in the liquid form. However, once the liquid coated products are cured, the monomers will be trapped in the solid matrix.

4. INTRODUCTION AND USE INFORMATION

MODE OF INTRODUCTION OF NOTIFIED CHEMICAL (100%) OVER NEXT 5 YEARS
The notified polymer will be imported by sea as part of the product Desmolux™XP 2491 (80% notified polymer).

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

Year	*1*	*2*	*3*	*4*	*5*
Tonnes	< 15	< 15	< 20	< 25	< 25

USE
A component of surface coatings for substrates e.g. wood.

5. PROCESS AND RELEASE INFORMATION

5.1. Distribution, transport and storage

PORT OF ENTRY
The notified polymer will be imported through Melbourne, by wharf.

IDENTITY OF MANUFACTURER/RECIPIENTS
Initially, the notified polymer will be introduced to a single industrial customer in Australia, located in Sydney, NSW. Introduction to other industrial customers not yet identified may also occur.

TRANSPORTATION AND PACKAGING
The notified polymer will not be manufactured in Australia. The notified polymer will be imported by ship as a component of Desmolux™XP 2491 at 80% concentration, in 200 L metal drums. The product will be transported from the wharf to paint formulators around Australia for warehousing for formulation into paint products. Truck drivers will transport the sealed drums by road from the wharf to the paint formulator's warehouse.

The imported product Desmolux™XP 2491 containing the notified polymer will be classified as a C1 substance (a combustible liquid that has a flash point of greater than 60.5°C and less than 150°C) according to AS1940 (Australian standard for "The storage and handling of flammable and combustible liquids").

5.2. Operation description

The notified polymer will not be manufactured in Australia.

Reformulation
The liquid polymer will be reformulated into paint products at multiple paint manufacturing sites. The 200 L drums of liquid product containing the notified polymer (up to 80%) will be transported by forklift or manually as required from the warehouse to the production area. At the paint plant the imported liquid product containing the notified polymer is transferred by metered dosing to a 1000 kg stainless steel mixing vessel, followed by mixing the notified polymer and other ingredients in a sealed vessel fitted with a high-speed mixer and local ventilation system. Quality control chemists will undertake sampling and analysis of the blended product. The resultant paint is filtered prior to being dispensed into 20 L closed head drums under exhaust ventilation for supply to customers. The concentration of the notified polymer in the final product will be < 50%. Paint products containing the notified polymer will be warehoused at the paint manufacturer's site and distributed to end-users.

All workers will wear PPE such as polymer resistant gloves, safety glasses, safety boots and coverall. Workers will have access to the Material Safety Data Sheet (MSDS).

End-Use
At the end users site the paint containing the notified polymer (< 50%) is applied to wood boards by roller coater or automatic spray machine (in certain instances some manual touch up may be required) and cured using UV curing which uses ultraviolet light or other radiation sources to initiate curing, which allows a permanent bond without heating, or electron beam curing which uses electron beam radiation to cure or initiate curing.

5.3. Occupational Exposure

Number and Category of Workers

Category of Worker	*Number*	*Exposure Duration*	*Exposure Frequency*
Transport and Storage			
Transporting from dock to paint manufacturers for reformulation (loading/unloading trucks)	2	2-3 hours/day	4 days/yr
Reformulation			
Paint make up	3	8 hours/day	4 days/yr
QC testing	1	8 hours/day	4 days/yr
Filling into drums	3	8 hours/day	4 days/yr
Maintenance workers	2	8 hours/day	4 days/yr
End-use			
Applied to wood boards using roller coater or automatic spray.	10	8 hours/day	30 days/yr

Exposure Details
Transport and storage
Transport and warehousing workers may come into dermal and ocular contact with the notified polymer through accidental leaks and spillages.

Reformulation
Dermal and ocular exposure to the notified polymer (up to 80%) may occur due to drips, spills and splashes during reformulation processes such as charging of mixer and blending, taking and testing quality control samples, batch adjustment, connecting filling lines and maintenance of equipment. However, exposure will be minimised by engineering controls such as local exhaust ventilation (LEV) and the use of PPE in accordance with the MSDS. Inhalation exposure during formulation or filling of paint is possible as aerosols may be released during blending however local exhaust ventilation systems should minimise exposure.

End use
Dermal and ocular exposure may occur during handling and application of paint containing the notified polymer (< 50%). Inhalation exposure due to aerosol formation may occur during spray application when manual touch-ups are required. Worker exposure is expected to be minimised as a result of the

use of engineering controls (such as spray booths for spray application) and protective equipment. The industrial painters will wear coveralls, safety goggles and impervious gloves, and appropriate respirators where required may be used during spray application of the paints. Once the notified polymer is cured it is bound in an inert matrix and not available for exposure.

5.4. Release

RELEASE OF CHEMICAL AT SITE

The notified polymer will not be manufactured in Australia. Local operations will include transport and storage, coating formulation, filling and packaging. Release at coating formulator's site to the environment may occur in the unlikely event of an accident during transport or an accidental leak. It is estimated that a maximum of 1% of the notified polymer (< 250 kg per year of notified polymer) would be lost during spillage. Spills are contained and soaked up with inert absorbent material (sand, diatomite, acid binders, universal binders, sawdust etc) and placed in a sealable container and disposed of to landfill.

The washings from the mixing vessel and process line will be collected and reused. Residue remaining in the empty drum is estimated to be 0.5% (< 125 kg per year of the notified polymer). The empty drums will be collected by a licensed waste contractor for disposal to landfill. The drums are rinsed with water before collection by waste disposal contractors. The rinseate is reused in the coating formulation. There will be no release of the notified polymer to sewer during formulation.

RELEASE OF CHEMICAL FROM USE

The reformulated polymer as a component (< 50%) of an industrial coating material will be applied to wooden boards. No consumer use is expected. The coating will be applied to boards by automated roller, automated spraying with manual touch up as required in approximately 10-20% of cases.

Overspray and other waste

Automated rollers and automated spraying are relatively efficient processes and waste is expected to be approximately 5 and 15% respectively. The overspray from manual touch up is expected to be approximately 50%. Assuming that rollers will account for 60% of the application, with automated and manual spray accounting for approximately 35 and 5% respectively, then waste from these operations is expected to be approximately as follows: 3% of the total (< 750 kg per annum) from rollers, 5% of the total from automated sprayers (1250 kg per annum) and 3% of the total (< 750 kg) from manual spraying. Overspray is typically intercepted by spray booth filters and water scrubbers. It is expected that scrubbers and filters will intercept > 99.9% of the notified polymer with less than 0.1% of the overspray (~2 kg per annum) being released to sewer. Collected overspray will be collected for disposal by a licensed contractor.

Equipment cleaning and spills

The equipment such as rollers and spray equipment are cleaned with water which is collected and sent off site to a liquid waste treatment facility. It is estimated that 2% of the import volume (< 400 kg/year) may be lost from cleaning of equipment.

Residues in the empty containers

The residues in the drums of coating product are expected to account for up to 1 % of the import volume (< 200 kg/year). The residue coating product will be collected by waste disposal contractors for disposal.

5.5. Disposal

Empty imported drums will be collected by a licensed waste contractor for disposal to landfill. During end-use residual paint in containers and the empty containers will be collected by a licensed waste contractor for disposal to landfill.

Collected overspray will be disposed of to landfill.

The majority of the notified polymer will be cured on wooden boards. The cured polymer will share the fate of the wooden boards. Sanding dust and boards are expected to be eventually disposed of by landfill.

5.6. Public exposure

The general public will not come into contact with the notified polymer or products containing it. Once the paint containing the notified polymer is applied to the wood boards and the paint has cured, the notified polymer is bound in an insoluble polymeric matrix. Therefore the risk of exposure of the general public to the notified polymer is considered to be low.

6. PHYSICAL AND CHEMICAL PROPERTIES

The following physicochemical data is provided for the product Desmolux XP 2491 containing the notified polymer at up to 80% in isobornyl methacrylate or where indicated with a *ethyl acetate.

Appearance at 20ºC and 101.3 kPa Pale yellow liquid with slight odour (Desmolux XP 2491)

Glass Transition Point* -63ºC pressure unspecified (Desmolux XP 2491)

METHOD	OECD TG 102 Melting Point/Melting Range. EC Directive 92/69/EEC A.1 Melting/Freezing Temperature.
Remarks	Determined by differential thermal analysis.
TEST FACILITY	Bayer (2007a)

Boiling Point* 324ºC, pressure unspecified (Desmolux XP 2491)

METHOD	OECD TG 103 Boiling Point. EC Directive 92/69/EEC A.2 Boiling Temperature.
Remarks	Determined by differential thermal analysis. The product also showed signs of decomposition during the boiling process. The boiling of the test substance may be due to evaporation of the decomposition products.
TEST FACILITY	Bayer (2007a)

Density* 1080 kg/m^3 at 23ºC (Desmolux XP 2491)

METHOD	OECD TG 109 Density of Liquids and Solids. EC Directive 92/69/EEC A.3 Relative Density.
Remarks	Determined using the displacement method.
TEST FACILITY	Bayer (2007a)

Vapour Pressure Not determined

Remarks	Estimated to be <10^{-6} kPa at 25ºC (Desmolux XP 2491) The notified polymer is of high molecular weight and therefore expected to have low vapour pressure.
TEST FACILITY	Bayer (2007a)

Water Solubility Not determined

Remarks	Expected to have low water solubility due to the polymer containing only hydrophobic and slightly polar (hydrophilic) functional groups. The log Pow value (see below) supports that the water solubility of the notified polymer will be low.

Viscosity 130,000 mPa. s at 23ºC (Desmolux XP 2491)

METHOD	Not specified.
Remarks	Information cited in MSDS for Desmolux XP 2491

Hydrolysis as a Function of pH Not determined

Remarks The notified polymer contains functional groups that could be expected to undergo hydrolysis under extreme pH conditions. However, in the environmental pH range of 4 to 9, significant hydrolysis is unlikely to occur.

Partition Coefficient (n-octanol/water) log Pow = 2.3 at 25ºC

METHOD In accordance with OECD TG 117 Partition Coefficient (n-octanol/water) and EC Directive 92/69/EEC A.8 Partition Coefficient.
Remarks HPLC Method. The log Pow value relates to the main component of Desmolux XP 2491. The range of values for all components of Desmolux XP 2491 was from -1.3 to +6.6.
TEST FACILITY Bayer (2007)

Adsorption/Desorption Not determined

Remarks The polymer has a relatively high Kow value and is not expected have high water solubility. It is therefore expected that the polymer will adsorb to, or be associated with, soil and organic carbon.
TEST FACILITY

Dissociation Constant Not determined.
Remarks No dissociable groups are present.
TEST FACILITY

Particle Size Test not conducted. The notified polymer is introduced in a liquid.

Flash Point 97ºC, pressure unspecified (Desmolux XP 2491)

METHOD Not specified.
The product is classified as a C1 combustible liquid.
Remarks Information cited in MSDS for Desmolux XP 2491

Flammability Test not conducted.

Remarks Based on the flash point, the product as introduced is not considered to be a flammable liquid.

Autoignition Temperature Approximately 365ºC (Desmolux XP 2491)

METHOD Not specified.
Remarks Information cited in MSDS for Desmolux XP 2491

Thermal Stability Testing* Decomposition and boiling of the product starts at 324°C. At 359°C the high pressure of the decomposition products causes the crucible to burst. (Desmolux XP 2491)

METHOD OECD TG 113 Screening Test for Thermal Stability and Stability in Air.
Remarks Determined using differential thermal analysis in a closed crucible.
TEST FACILITY Bayer (2007a)

Explosive Properties

Remarks The notified polymer is not expected to have explosive properties, since there are no chemical groups that would infer explosive properties, based on a review of the structural formula and information cited in "Bretherick's Handbook of Reactive Chemical Hazards" (Bretherick, 1990).

Reactivity

Remarks	Stable under normal conditions of use and storage. Exposure to high temperature causes exothermic reaction or decomposition. Strong exothermic reactions with peroxides may occur in presence of heavy metal ions. Thermal decomposition products include: carbon dioxide, carbon monoxide and oxides of nitrogen.

7. TOXICOLOGICAL INVESTIGATIONS

No toxicity data were submitted

8. ENVIRONMENT

8.1. Environmental fate

No environmental fate data were submitted. The polymer is not expected to bioaccumulate as it is high molecular weight and is unlikely to cross biological membranes. The polymer is expected to eventually undergo in-situ degradation by biotic and abiotic processes to form landfill gases including methane, ammonia, oxides of carbon and nitrogen; and water vapour.

8.2. Ecotoxicological investigations

No ecotoxicity data were submitted for the notified polymer.

9. RISK ASSESSMENT

9.1. Environment

9.1.1. Environment – exposure assessment

The majority (~85%; < 17 tonnes per annum) of the polymer will be used to coat wooden substrates. The notified polymer will then be cured and will eventually be landfilled at the end of the wooden substrates useful life. Approximately 15% (< 3 tonnes per annum) will be wasted during coating and reformulation operations. This will be collected for disposal to landfill as cured waste by a licensed contractor. A minute amount (< 0.01%; < 2 kg per annum) from overspray that is not intercepted by engineering controls may be released to sewer. Assuming that this release to sewer occurs over 260 working days, to the major sewage treatment plant in Sydney treating 456 ML per annum then a worst case PEC, can be calculated as 0.02 µg/L at sewage outfall. The actual PEC is expected to be even lower due to the curing of the polymer, adsorption of the notified polymer to sewage sludge and dilution at the ocean outfall.

9.1.2. Environment – effects assessment

No ecotoxicological data were submitted and a predicted no effect concentration (PNEC) cannot be calculated. However, the polymer is expected to be poorly water soluble and is unlikely to cross biological membranes.

9.1.3. Environment – risk characterisation

Although a risk quotient cannot be calculated from the PEC/PNEC ratio, the release to the aquatic environment is expected to be minimal and hence the risk to the aquatic environment is expected to be acceptable.

9.2. Human health

9.2.1. Occupational health and safety – exposure assessment

Dermal and ocular exposure may occur during reformulation as a result of paint drips, spills and splashes during charging of mixer and blending, taking and testing quality control samples, batch adjustment, connecting filling lines and maintenance of equipment as well as handling and application of paint containing the notified polymer. Inhalation exposure due to aerosol formation may occur during paint formulation and filling of paint and during end use spray application when manual touch-ups are required. Worker exposure during reformulation and end-use is expected to be minimised as a result of the use of engineering controls (such as local

exhaust ventilation, automated application of the surface coating by roller coating and spraying and the use of spray booths for spray application by manual touch up) and personal protective equipment in accordance with the MSDS. Once the notified polymer is cured it is bound in an inert matrix and not available for exposure.

9.2.2. Public health – exposure assessment

The notified polymer will be present in wood products that the public are likely to come into contact with. However, the notified polymer is unlikely to be bioavailable as it becomes encapsulated within a polymer matrix during curing. Therefore the level of public exposure is expected to be low.

9.2.3. Human health – effects assessment

No toxicological data have been provided for the notified polymer

The notified polymer contains an acrylate functional group, which is considered to be of high concern. Acrylates are listed as a default category on HSIS (Hazardous Substance Information Database) as skin, eye and respiratory irritants Xi: R36/R37/R38 (HSIS, 2007). Acrylates are also listed on the USEPA TSCA New Chemicals Program (NCP) Chemical Categories. The USEPA human health concerns relate to the potential to cause irritation and/or sensitisation. The EPA normally recommends engineering controls and PPE to minimise exposure. However the EPA does not control acrylates based on health concerns unless the acrylate is structurally similar to substance for which the EPA has positive toxicity data. Acrylates may also cause sensitisation (Barratt 1994, TSCA, 2002) however due the high molecular weight of the notified polymer (>1000) the potential for sensitisation is reduced. However the potential for skin sensitisation upon exposure to the notified chemical cannot be ruled out.

Based on the available data the notified polymer is classified as hazardous under the NOHSC *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 2004). The classification and labelling details are:
R36/37/38: Irritating to eyes, respiratory system and skin

9.2.4. Occupational health and safety – risk characterisation

The notified polymer has not been tested for any toxicological properties, however, it is expected to be an eye, skin and respiratory irritant.

The risk of these effects is greatest when handling the imported products containing the notified polymer particularly during manual transfer into the blending vessel when reformulating into paint and during end-use manual application of the paints. However, the risk is expected to be mitigated through the use of engineering controls and personal protective equipment.

All operations involving the notified chemical should take place under local exhaust ventilation and workers should wear PPE to minimise skin, eyes and inhalation exposure. Overall the risk to workers can be considered acceptable if such controls are in place.

9.2.5. Public health – risk characterisation

The exposure of the public to the notified polymer is expected to be low; therefore the risk to public health is low.

10. CONCLUSIONS – ASSESSMENT LEVEL OF CONCERN FOR THE ENVIRONMENT AND HUMANS

10.1. Hazard classification

Based on the available data the notified polymer is classified as hazardous under the NOHSC *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 2004). The classification and labelling details are:
R36/37/38: Irritating to eyes, respiratory system and skin

10.2. Environmental risk assessment

The notified polymer is not considered to pose a risk to the environment based on its reported use pattern.

10.3. Human health risk assessment

10.3.1. Occupational health and safety

There is Low Concern to occupational health and safety under the conditions of the occupational settings described.

10.3.2. Public health

There is No Significant Concern to public health when used in the proposed manner.

11. MATERIAL SAFETY DATA SHEET

11.1. Material Safety Data Sheet

The MSDS of the product containing the notified polymer provided by the notifier was in accordance with the NOHSC *National Code of Practice for the Preparation of Material Safety Data Sheets* (NOHSC 2003). It is published here as a matter of public record. The accuracy of the information on the MSDS remains the responsibility of the applicant.

11.2. Label

The label for the product containing the notified polymer provided by the notifier was in accordance with the NOHSC *National Code of Practice for the Labelling of Workplace Substances* (NOHSC 1994). The accuracy of the information on the label remains the responsibility of the applicant.

12. RECOMMENDATIONS

REGULATORY CONTROLS

Hazard Classification and Labelling

- Use the following risk phrases for products/mixtures containing the notified polymer:
  - Concentration ≥ 10%: R36/37/38 (based on HSIS, 2007, listing for acrylates)

- Use the following safety phrases for products/mixtures containing the notified polymer ≥ 10%:
  - S23 Do not breathe aerosol
  - S26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice

CONTROL MEASURES

Occupational Health and Safety

Commented [s1]: NICNAS

- Employers should implement the following engineering controls to minimise occupational exposure to the notified polymer:
  - Local exhaust ventilation should be in place during all operations involving handling of the notified polymer.
  - Enclosed tanks and lines for formulation and automated filling of paint containing the notified polymer.

- Employers should implement the following safe work practices to minimise occupational exposure during handling of the notified polymer:
  - Avoid contact with eyes and skin.
  - Avoid inhalation.

- Spray application of paint containing the notified polymer should be in accordance with the NOHSC *National Guidance Material for Spray Painting* (NOHSC, 1999).
- Workers using spray products containing the notified polymer should be instructed in their proper handling and use.

- Employers should ensure that the following personal protective equipment is used by workers to minimise occupational exposure to the notified polymer:
  - Gloves.
  - Safety goggles.
  - Respiratory protection where appropriate.
  - Protective clothing.

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

- A copy of the MSDS should be easily accessible to employees.

- If products and mixtures containing the notified polymer are classified as hazardous to health in accordance with the NOHSC *Approved Criteria for Classifying Hazardous Substances*, workplace practices and control procedures consistent with provisions of State and Territory hazardous substances legislation must be in operation.

Disposal

- The notified polymer should be disposed of by licensed contractors and authorised landfill.

Storage

- The following precautions should be taken regarding storage of the notified polymer:
  - Storage in accordance with the NOHSC *National Standard for the Storage and Handling of Workplace Dangerous Goods* (NOHSC 2001) for C1 combustible liquids.

Emergency procedures

- Spills or accidental release of the notified polymer should be handled by physical containment (e.g. diking) with adsorbent material (vermiculite sand etc.). Place in suitable containers for disposal.

12.1. Secondary notification

The Director of Chemicals Notification and Assessment 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; and/or
  - information becomes available as to an adverse effect of the notified polymer on occupational health and safety, public health, or the environment.

or

(2) Under Section 64(2) of the Act:
  - if any of the circumstances listed in the subsection arise.

The Director will then decide whether secondary notification is required.

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