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

PUBLIC REPORT

Polymer in TECHNOMELT PUR 4655 ME

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 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/1752	Henkel Australia Pty Ltd	Polymer in TECHNOMELT PUR 4655 ME	Yes	≤ 100 tonnes per annum	Component of adhesive

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.

Based on the presence of the isocyanate functional group in the notified polymer, the notified polymer is recommended for hazard classification according to the *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 2004) with the following risk phrase:

R42: May cause sensitisation by inhalation

Human health risk assessment

Provided that the recommended controls are being adhered to, under the conditions of the occupational setting, 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

Based on its expected low hazard and assessed use pattern, the notified polymer is not considered to pose an unreasonable risk to the environment.

Recommendations

REGULATORY CONTROLS

Health Surveillance

- As the notified polymer is a potential respiratory and skin sensitizer, employers should carry out health surveillance for any worker who has been identified in the workplace risk assessment as having a significant risk of sensitisation.

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 during application:
 - Enclosed, automated processes, where possible
 - Ventilation system including local exhaust ventilation during application, and good general ventilation during curing
- 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 skin and eyes
- Avoid inhalation of vapours, mists or aerosols
- 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:
 - Safety glasses
 - Coveralls
 - Impervious gloves
 - Respiratory protection when inhalation exposure may occur

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

- Atmospheric monitoring should be conducted to measure workplace concentrations of isocyanates during use of products containing the notified polymer. Employers should ensure that the exposure standard for isocyanates [NOHSC:1003 (1995)] is not exceeded for all areas where the notified polymer will be handled.
- 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.

Storage

- The handling and storage of the notified polymer should be in accordance with the Safe Work Australia Code of Practice for *Managing Risks of Hazardous Chemicals in the Workplace* (SWA, 2012) or relevant State or Territory Code of Practice.

Emergency procedures

- Spills or accidental release of the notified polymer should be handled by containment, physical 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 importation volume exceeds one tonne per annum notified chemical;
 - 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, 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.

No additional secondary notification conditions are stipulated.

(Material) Safety Data Sheet

The (M)SDS of the 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

Henkel Australia Pty Ltd (ABN: 82 001 302 996)
135 – 141 Canterbury Road
KILSYTH VIC 3137

NOTIFICATION CATEGORY

Limited: Synthetic polymer with $M_n \geq 1,000$ Da.

EXEMPT INFORMATION (SECTION 75 OF THE ACT)

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

VARIATION OF DATA REQUIREMENTS (SECTION 24 OF THE ACT)

Variation to the schedule of data requirements is claimed for all physicochemical endpoints.

PREVIOUS NOTIFICATION IN AUSTRALIA BY APPLICANT(S)

None

NOTIFICATION IN OTHER COUNTRIES

None

2. IDENTITY OF CHEMICAL

MARKETING NAME

TECHNOMELT PUR 4655 ME (hot melt adhesive containing the notified polymer at < 60% concentration)

OTHER NAME(S)

PURMELT ME 4655 (notified polymer)

MOLECULAR WEIGHT

$M_n > 1,000$ Da

ANALYTICAL DATA

Reference IR and GPC spectra were provided.

3. COMPOSITION

DEGREE OF PURITY

> 90%

4. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE AT 20 °C AND 101.3 kPa: Amber coloured solid*

Property	Value	Data Source/Justification
Softening Point*	~55 °C	(M)SDS
Boiling Point	Not determined	Decomposition anticipated before boiling
Density*	1,130 – 1,230 kg/m ³ at 20 °C	(M)SDS
Vapour Pressure	Not determined	Expected to be low based on high molecular weight
Water Solubility	Not determined	The notified polymer contains groups that readily react with water to form carbon dioxide and insoluble high molecular weight polymers
Hydrolysis as a Function of	Not determined	The notified polymer contains groups that

pH		readily react with water to form carbon dioxide and insoluble polymeric masses
Partition Coefficient (n-octanol/water)	Not determined	Expected to react with water and octanol to form carbon dioxide and insoluble polymeric masses
Adsorption/Desorption	Not determined	The notified polymer contains groups that readily react with water to form carbon dioxide and insoluble polymeric masses
Dissociation Constant	Not determined	Contains no dissociable functional groups at environmental pH
Particle Size	Not expected	Notified polymer is introduced as a solid and will never be isolated from the product. As such the notified polymer will not exist in a particulate form
Flash Point	Not determined	Solid
Flammability	Not determined	Not expected to be highly flammable
Autoignition Temperature	Not determined	Not expected to autoignite at ambient temperature and during normal use
Explosive Properties	Not determined	Not expected to be explosive based on chemical structure
Oxidising Properties	Not determined	Not expected to be oxidising based on chemical structure

* For the imported adhesive product TECHNOMELT PUR 4655 ME containing the notified polymer at < 60% concentration.

DISCUSSION OF PROPERTIES

Reactivity

The notified polymer is expected to be stable under normal conditions of temperature and pressure. The adhesive product containing the notified polymer should be kept away from open flames in addition to alcohols and oxidising agents. The product reacts readily with water to produce carbon dioxide and insoluble solids.

When heated to decomposition, the adhesive containing the notified polymer will emit toxic fumes of oxides of carbon and nitrogen, and hydrogen cyanide.

The adhesive containing the notified polymer may polymerise at temperatures above 200 °C.

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 be imported at < 60% concentration as a component of a polyurethane reactive hot melt adhesive.

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

Year	1	2	3	4	5
Tonnes	< 100	< 100	< 100	< 100	< 100

PORT OF ENTRY
Melbourne and Sydney

TRANSPORTATION AND PACKAGING

The notified polymer will be imported as a component (at < 60% concentration) of a polyurethane reactive hot melt adhesive. The adhesive (containing the notified polymer) will be packaged in air tight 20 kg steel pails and 190 kg steel drums. The adhesive will be transported to the notifier and to end-use sites by road.

USE

The notified polymer will be used as a component (at < 60% concentration) of a polyurethane reactive hot melt adhesive for use in surface and assembly bonding in lamination, general assembly bonding, and gluing of fibreboard, textiles and plastics.

OPERATION DESCRIPTION

There will be no reformulation or repackaging in Australia. At end-use sites, the import containers will be placed directly, after removing the lids and sealing film, into a bulk melter unit. The bulk melter unit will heat the product containing the notified polymer (at < 60% concentration) to the set temperature and dose heated rollers which apply the melted adhesive to the substrate. The material to be bonded will be applied manually onto the glued substrate and pressure will be applied until the adhesive is cured.

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>
Warehouse	1	20
Transport	0	12
Process Workers	5	150
Disposal Workers	1	20

EXPOSURE DETAILS*Transport and Storage*

Transport and storage workers are not expected to be exposed to the notified polymer except in the unlikely event of an accident.

Application

Dermal, ocular or inhalation exposure to the notified polymer (at < 60% concentration) may occur when opening the containers and application of the adhesive. Exposure should be minimised by the stated use by the notifier of PPE including gloves, safety glasses (with side shields), coveralls and respirators. The notifier also states that the application process should be conducted under appropriate extractive equipment which should further minimise inhalation exposure to the notified polymer and its decomposition products.

Workers may also be exposed to residues of the adhesive containing the notified polymer during cleaning and maintenance of application equipment. Exposure should be minimised by the stated use of PPE by the notifier including safety glasses, gloves, coveralls, and respiratory protection.

6.1.2. Public Exposure

The adhesive containing the notified polymer is intended for industrial use and will not be available to the public. Once the adhesive is cured and dried, the notified polymer will be reacted into the adhesive polymeric matrix and will not be available for exposure.

6.2. Human Health Effects Assessment

No toxicity data were submitted for the notified polymer.

The notified polymer is not expected to be absorbed across biological membranes to a significant extent based on its high molecular weight ($M_n > 1,000$ Da) and low percentage (< 4%) of low molecular weight species (< 1,000 Da).

The notified polymer contains isocyanate functional groups that are of concern for irritation, dermal and respiratory sensitisation, and pulmonary toxicity (Barrett 1994, US EPA 2010, Kirk-Othmer 1995).

The USEPA specifies that structures with isocyanate equivalent weights of $\geq 5,000$ Da are presumed not to pose a hazard under any conditions. In addition, concerns are generally confined to species with molecular weights $< 1,000$ Da. The isocyanate functional group equivalent weight of the notified polymer is $< 5,000$ Da and although its molecular weight is $> 1,000$ Da, the polymer contains a proportion of low molecular weight species; hence the risks cannot be ruled out.

Polymeric isocyanates tend to be non-volatile and are therefore expected to be less of an inhalation hazard compared to non-polymeric isocyanates. However, polymeric isocyanate aerosols may cause respiratory sensitisation similar to monomer vapours, and reports have shown that inhalation of relatively non-volatile isocyanates in the form of dusts and spray mists could cause adverse respiratory effects (HSIS, 2008). Isocyanates may also cause respiratory sensitisation by skin contact (US EPA, 2010).

According to the Approved Criteria for Classifying Hazardous Substances (NOHSC, 2004), substances containing isocyanate functional groups should be classified as hazardous if there is no evidence to indicate that the substance does not cause respiratory hypersensitivity. Thus, the following risk phrase should be applied to the notified polymer:

R42: may cause sensitisation by inhalation

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).

Based on the presence of the isocyanate functional group in the notified polymer, the notified polymer is recommended for hazard classification according to the *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 2004) with the following risk phrase:

R42: may cause sensitisation by inhalation

6.3. Human Health Risk Characterisation

6.3.1. Occupational Health and Safety

The notified polymer contains isocyanate functional groups that are of concern for irritation, skin and respiratory sensitisation and pulmonary toxicity. Dermal and ocular exposure to the notified polymer at $< 60\%$ concentration during transfer and application of the adhesive is expected to be limited by the use of PPE. Due to the expected low volatility of the notified polymer and given the expected use of appropriate extractive equipment, inhalation exposure is not anticipated. Therefore, provided control measures are in place to reduce exposure, the risk to the health of workers from use of the notified polymer is not considered to be unreasonable.

6.3.2. Public Health

The notified polymer is intended for use in industrial applications only. The public may be exposed to products manufactured using the adhesive containing the notified polymer. Once the adhesive is cured and dried, the notified polymer will be reacted into the adhesive polymeric matrix and will not be available for exposure. Therefore, when used as proposed, the risk to public health from use of the notified polymer is not considered unreasonable.

7. ENVIRONMENTAL IMPLICATIONS

7.1. Environmental Exposure & Fate Assessment

7.1.1. Environmental Exposure

RELEASE OF CHEMICAL AT SITE

The notified polymer will not be manufactured in Australia. Therefore, no release of the notified polymer to the environment is expected from this activity. If release does occur as a result of an accident during transport, it is expected to be contained, collected and disposed of to landfill.

RELEASE OF CHEMICAL FROM USE

The notified polymer is expected to be applied to surfaces, textiles and plastics by heated roller-coater. Waste generated from leaks and spills is expected to cure to an inert solid on exposure to ambient conditions and the cured mass will be disposed of to landfill.

RELEASE OF CHEMICAL FROM DISPOSAL

The majority of the notified polymer will be incorporated in a polymer matrix and bound to the substrate after application. It is expected to share the fate of the substrate and be disposed of to landfill. Residual notified polymer in empty import containers is expected to be cured into an inert solid matrix and be disposed of to landfill along with the empty containers.

7.1.2. Environmental Fate

No environmental fate data were submitted. The majority of the notified polymer is expected to be disposed of to landfill as cured waste, residues in empty containers, and coated articles at the end of their useful life. The notified polymer will be irreversibly cross-linked into a solid polymer matrix as part of its normal use pattern and is therefore not expected to be mobile, bioavailable or readily biodegradable in this form. The notified polymer is expected to eventually degrade biotically or abiotically in landfill into water and oxides of carbon and nitrogen.

7.1.3. Predicted Environmental Concentration (PEC)

The notified polymer rapidly reacts with moisture (water) to form insoluble, non-bioavailable, high molecular weight solids. A predicted environmental concentration (PEC) was not determined because the notified polymer is not expected to persist in the aquatic compartment due to its hydrolytic instability. The notified polymer is never isolated from the coated articles containing the notified polymer. Moreover, very limited aquatic exposure to the notified polymer or its hydrolysis products is expected when the notified polymer is used as proposed.

7.2. Environmental Effects Assessment

No ecotoxicological data were submitted. The notified polymer is not expected to persist in water due to its hydrolytic instability. In addition, the notified polymer, which is never isolated from the coated articles, reacts with moisture (water) to form insoluble, non-bioavailable, high molecular weight solids. Therefore, the notified polymer is expected to be of low concern to the aquatic environment.

7.2.1. Predicted No-Effect Concentration

The predicted no-effect concentration (PNEC) for the notified polymer has not been calculated as no ecotoxicological data for the polymer were submitted and the notified polymer is expected to be of low concern to the aquatic environment.

7.3. Environmental Risk Assessment

The risk quotient ($Q = \text{PEC}/\text{PNEC}$) for the notified polymer has not been calculated as release to the aquatic environment is not expected based on its reported use pattern as a hot melt adhesive. The majority of the notified polymer will be disposed of to landfill as a cured matrix. The notified polymer is irreversibly bound into a solid inert matrix, and is unlikely to be bioavailable or mobile in this form. Therefore, based on its expected low hazard and assessed use pattern, the notified polymer is not considered to pose an unreasonable risk to the environment.

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