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NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME

FULL PUBLIC REPORT

Polymer in HR-42-8304

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Director
Chemicals Notification and Assessment

FULL PUBLIC REPORT

Polymer in HR-42-8304

1. APPLICANT

PPG Industries Australia Pty Ltd of McNaughton Rd, CLAYTON, VIC 3168 has submitted a limited notification statement in support of their application for an assessment certificate for Polymer in HR-42-8304.

2. IDENTITY OF THE CHEMICAL

The chemical name, CAS number, molecular and structural formulae, molecular weight, spectral data, details of the polymer composition and details of exact import volume and customers have been exempted from publication in the Full Public Report and the Summary Report.

Marketing Name:	HR-42-8304 WE-87-2424 E6214
Other Names:	PMN 2354

3. PHYSICAL AND CHEMICAL PROPERTIES

The notified polymer will be imported in the form of an aqueous dispersion containing a high proportion of polymers. The data below is for the solution as manufactured containing a very high proportion of notified polymer in methyl isobutyl ketone (MIBK).

Appearance at 20°C and 101.3 kPa:	viscous liquid
Boiling Point:	not determined (see comments below)
Specific Gravity:	1.09 (for the solution)
Vapour Pressure:	not determined (see comments below)
Water Solubility:	0.19 mg/L at 20°C
Partition Co-efficient (n-octanol/water):	log P_{ow} ~ 5.7

Hydrolysis as a Function of pH:	not determined (see comments below)
Adsorption/Desorption:	not determined (see comments below)
Dissociation Constant:	no dissociable groups present
Flash Point:	31 °C (based on the solvent, MIBK)
Flammability Limits:	not determined (see comments below)
Autoignition Temperature:	not determined (see comments below)
Explosive Properties:	not expected to be explosive
Reactivity/Stability:	not reactive under normal environmental conditions

Comments on Physico-Chemical Properties

Water solubility data was determined by the standard shaker flask method specified by OECD guidelines.

The polymer is essentially insoluble in water and is not expected to hydrolyse in the environmental pH range (4 - 9) in spite of the carbamate functionality.

The n-octanol/water partition co-efficient determined by the ratio of the solubility in these two solvents is relatively high and the notified polymer can be expected to bind strongly to, or be associated with, soil and sediment.

Adsorption to the organic matter in soils is expected to be high due to the extremely low water solubility. Furthermore, high mobility of the polymer through the soil would not be expected and upon drying the polymer crosslinks to form an insoluble clear solid that would be immobile.

4. PURITY OF THE CHEMICAL

Degree of Purity:	> 80 % in MIBK
Maximum Content of Residual Monomers:	All residual monomers are present at < 1 %, and hazardous residual monomers are present below the respective cutoff levels for classification of the polymer as hazardous.
Toxic or Hazardous Impurities:	none
Non-hazardous Impurities	none

(> 1% by weight):

Additives/Adjuvants:

The toxic or hazardous adjuvants are present at concentrations below the cutoff for classification of the notified polymer or the products containing the notified polymer as hazardous; the exact concentrations are confidential.

Chemical name:	methyl isobutyl ketone
Synonyms:	2-pentanone, 4-methyl-, MIBK
CAS No.:	108-10-1
Weight percentage:	confidential
Toxic properties:	Eye and respiratory tract irritant; there is a NOHSC exposure standard for this chemical of 50 ppm (TWA) and 75 ppm (STEL)

5. USE, VOLUME AND FORMULATION

The notified polymer will not be manufactured in Australia. Initially, it will be imported as part of an aqueous coating resin formulation at a concentration of less than 10 % (w/v). Later it will be imported as a resin solution at a concentration of over 80 % (w/v) and blended locally to produce the aqueous coating resin formulation. The formulated product will be diluted by approximately a factor of two prior to end use. The coating resin and the resin dispersion will be imported in 200 L drums or 1000 L tote tanks.

The polymer will be used as a crosslinker in an electrodepositable coating composition used as a primer coating for automobile bodies in an immersion bath. The polymer will only be used in automobile assembly plants.

The import volume within the first five years will be a maximum of 75 tonnes per annum.

6. OCCUPATIONAL EXPOSURE

Transport and Storage
The notified polymer as part of a formulated aqueous coating resin product will be transported from the docks to the notifier's warehouse, where it will be distributed to the 13 possible customer sites in Australia. After the first year, the notified polymer will be imported as a 26 % aqueous dispersion for local blending. The blended product will then be delivered by tanker to the customer sites. The notifier expects that 2 waterside workers and 2 warehouse workers, along with an unspecified number of transport drivers, will handle the containers of the coating formulation or resin dispersion containing the notified polymer, for approximately 4 hours, 30 times a year. The original containers will not be opened, so it is unlikely that these workers will be exposed, except in the event of an accident involving the rupture of a drum or tank.

During tanker transfer, there is possible exposure of drivers and storage workers being

exposed to drips and spills containing the notified polymer while connecting and disconnecting transfer hoses.

Reformulation
The blending operation, when commenced, will be carried out in a sealed, automated blending system. The imported resin solution, containing more than 80 % notified polymer will be pumped from the import containers into the sealed blend tank and mixed with water and other ingredients to produce the formulated aqueous coating resin product, containing up to 10 % notified polymer. The reformulated product will be pumped to a storage tank, and then to delivery tankers.

The notifier estimates that 2 plant operators and 1 laboratory worker will be involved in handling the notified polymer in this operation. The exposure is estimated to be for 4 hours per day, 50 days per year.

Dermal exposure to drips and spills containing the notified polymer will be possible when containers are exchanged and transfer hoses connected and disconnected. The product will be sampled through sampling valves, and dermal exposure is also possible at this time, as well as during laboratory testing.

The notifier states that workers handling the notified polymer during this process would wear impervious gloves, coveralls and goggles.

Primer Application
The notified polymer is used in a section of the automated production line in automobile assembly plants. The electrodeposition process involves the use of a potentially dangerous electric current in a wet environment, so the plant operators and the bath containing the notified polymer are physically separated during the normal operation of the production line.

The notifier estimates that 2 plant operators per shift will be exposed to the notified polymer at each production facility. The exposure is estimated to be for 2 hours per shift, 250 times per year.

The product containing the notified polymer will be transferred from the import tanks to a storage tank using a coupling hose. There is possibility of dermal exposure to drips and spills when the containers are exchanged and the transfer hoses are disconnected and reconnected. The product can alternatively be pumped from the imported drums directly into the water bath where it is used by drum lance. Again the transfer from the imported container will involve possible dermal exposure to drips and spills.

The formulation containing the notified polymer is dispensed into a large water bath from the storage tank via a fixed automated transfer system.

The automobile bodies are lowered into the water bath by the production line conveyor until completely submerged; a negative voltage is then applied and the electrostatically charged paint is deposited onto the body. The conveyor then lifts the automobile body out of the bath and excess polymer solution is washed off back into the bath with water; the concentration of the bath is maintained as the wash water is recirculated from the bath through an ultrafiltration system. The automobile body is then transferred by conveyor to a baking oven, where the crosslinking reaction occurs. After this process, the polymer coating is crosslinked

and the notified polymer is no longer separately available for exposure.

There is a need for periodic sampling and testing of the bath contents to ensure that the concentrations of all of the paint components, including the notified polymer, are maintained. Dermal exposure of plant operators to the bath contents is possible during sampling. The testing is performed by laboratory personnel. Dermal exposure of these workers is also possible.

Exposure during disposal and plant cleaning is unlikely, as the process is continuous with no buildup of impurities which would require the changeover of bath solutions. The notifier states that changing from one electrodeposition paint system to another would be done by adding the new paint materials when topping up the bath contents, so that the bath contents would be gradually changed and no cleaning and disposal would be required.

The bath containing the notified polymer is enclosed and local exhaust ventilation is used to remove any solvent vapours which may be present. The baking oven will be vented to the atmosphere through an afterburner at 760°C, which will remove any oven fumes.

Plant operators would be expected to wear gloves, protective eyewear and clothes, and other personal protective equipment as required.

7. PUBLIC EXPOSURE

The notified polymer will only be used by industrial automobile manufacturers, and is not available to the general public. Once applied to the automobile body, the notified polymer is bound in an insoluble polymeric matrix, and not separately available for exposure. In addition, it will be covered by several layers of paint. Consequently, the potential for public exposure to the notified polymer through all phases of its life cycle is considered to be negligible.

8. ENVIRONMENTAL EXPOSURE

Release

The notifier does not expect release of the notified polymer to take place as part of the coating operation due to the efficiency of the coating process. Paint is applied to motor vehicles with approximately 100% efficiency. The resulting surface coat is heat cured and any spills that occur will be contained in the plant bunding.

Waste material from spills that may occur in transfer of material from drums or bulk tanks is collected by a licensed waste contractor for disposal. The notifier indicates that this waste is treated by flocculation, filtration and centrifuging with the supernatant being released to waste sewer and the solid dried and sent to landfill. Residual from testing is returned to the application bath. Empty drums are sent to a drum recycler and are cleaned by incineration. Bulk tanks are rinsed with water, the rinsate being returned to the process and the tank returned for reuse.

The cleaning of the application bath is normally done every 2 years. The product is pumped

from the bath to a reserve bulk tank and the bath cleaned with water. The wash water is removed and treated by a licensed waste contractor. Apart from accidents during transport, the possible release of uncured polymer to the environment is negligible. Furthermore, the cured polymer will be further coated with paint before release to the environment.

It is anticipated that up to 3.5 % of the imported volume will be released as a result of spillage (1 %), cleaning (1 %) and residue in drums and totes (1.5 %). This would result in the release of approximately 2.6 tonnes of notified polymer per annum.

Fate

Once the notified polymer is applied as part of the automotive surface coating the polymer will be incorporated in an inert film and would not present a significant hazard. Any fragments, chips or flakes of the coating will be of little concern as they are expected to be inert. The metal panels coated with the polymer are likely to be either recycled for steel reclamation or be placed into landfill at the end of their useful life. When recycled, the polymer would be destroyed in the blast furnaces and converted to water vapour and oxides of carbon.

The small amount of solid waste generated in the application of the coating will be disposed to landfill (although incineration is an option). Presumably, the polymer is recovered as an insoluble solid from the wastewater used for cleaning and also disposed to landfill. The containers and their residues will also be disposed of in this manner.

When deposited into landfill as residues from transport containers or sampling apparatus, the organic components of the paint coating including the new polymer would be inert and immobile, but could nevertheless be expected to be very slowly degraded through the biological and abiotic processes operative in these facilities. Leaching of the polymer from landfill from these sites is unlikely, given the low solubility of the substance.

The polymer is not expected to cross biological membranes, due to low solubility, high molecular weight and the expected limited exposure to water is likely to inhibit its bioaccumulation potential of PMN 2155.

9. EVALUATION OF TOXICOLOGICAL DATA

9.1 Acute Toxicity

Summary of the acute toxicity of Polymer in HR-42-8304 (PMN 2354).

Test	*Species*	*Outcome*	*Reference*
acute oral toxicity	rat	LD_{50} > 2000 mg/kg	(Naas, 1995)

9.1.1 Oral Toxicity (Naas, 1995)

Species/strain: rat/Crl:CD®BR

Number/sex of animals:	5/sex
Observation period:	14 days
Method of administration:	gavage, 92 % in acetone
Dose:	2000 mg/kg
Test method:	Limit test; OECD TG 401
Mortality:	no deaths were recorded during the study
Clinical observations:	one animal had wet and dried yellow urogenital staining on days 1 and 2, respectively; all animals appeared normal for the remainder of the study
Morphological findings:	no treatment related findings were made
LD_{50}:	> 2000 mg/kg
Result:	the notified chemical was of very low acute oral toxicity in rats

9.2 Overall Assessment of Toxicological Data

The acute oral toxicity of the notified polymer is very low. No studies of dermal or inhalation toxicity or skin irritation or sensitisation were provided by the notifier, which is acceptable for a limited notification of a polymer with NAMW > 1000.

There is a high proportion of low molecular weight species in the notified polymer, with greater potential to cross biological membranes than species of MW > 1000, but as there were no major clinical or pathological findings in the oral toxicity study, the notified polymer would not be expected to have substantial systemic toxicity by any route.

10. ASSESSMENT OF ENVIRONMENTAL EFFECTS

No ecotoxicity data is required according to the Act, since the notified polymer has a number average molecular weight (NAMW) > 1000. While at 1009 the NAMW is very close to the cut-off where aquatic toxicity data are required, there will be very little exposure to the aquatic compartment.

11. ASSESSMENT OF ENVIRONMENTAL HAZARD

The notified polymer will be imported as a semi-finished polymer solution which will subsequently be reformulated to produce an electrodepositable automotive primer coating for automobile bodies. This coating solution is then applied to car bodies in a controlled factory environment.

The polymer is applied as a primer layer and crosslinks with other paint components to form a very high molecular weight and stable paint film. The polymer, as part of the surface coating, will therefore share the fate of the vehicle panel. The paint will slowly deteriorate under the action of UV light, but this is negligible over the life of the motor vehicle. When the vehicle panel is recycled, the polymer would be destroyed through incineration.

There will be some waste (< 5 %) through spillage, cleaning and residues. The majority of the notified polymer associated with the waste from the application of the coating to the automotive surface should not enter the environment until it is disposed of in landfill or incinerated. Movement of the polymer by leaching from landfill sites is not expected because of lack of mobility due to either its low solubility and strong binding affinity to soil, or crosslinking in the cured coating. Hence the overall environmental hazard of the notified polymer will be low when used as a component of a primer coating.

12. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY EFFECTS

Little toxicological data has been provided and the notified polymer cannot be assessed against the NOHSC *Approved Criteria for Classifying Hazardous Substances* (National Occupational Health and Safety Commission, 1994b). The notified polymer is of very low oral toxicity. There is a high proportion of low molecular weight species in the notified polymer, with greater potential to cross biological membranes than species of MW > 1000, but as there were no major clinical or pathological findings in the oral toxicity study, the notified polymer would not be expected to have substantial systemic toxicity by any route.

Occupational Health and Safety
There is little potential for significant occupational exposure to the notified polymer in the transport and storage of the resin dispersions or the formulated primer components containing this polymer.

The blending system in which the resin dispersion is reformulated to produce the primer components is enclosed and exposure to the notified polymer is only likely when containers are coupled and uncoupled, and when samples are removed from the blend tank for testing.

Similarly, the system by which the primer component is dispensed and used is enclosed, and exposure to the notified polymer is only likely when containers are coupled and uncoupled from the production line, and when samples of the electrodeposition bath are removed for testing to allow the concentration of polymer in the bath to be maintained. In normal operation, the electrodeposition bath containing the notified polymer will be completely enclosed due to the electrocution hazard associated with the electrodeposition process.

Plant operators and laboratory staff who may come into contact with the notified chemical should take adequate precautions, including the wearing of protective clothing, eyewear and gloves to prevent dermal or ocular exposure.

Public Health
There is negligible potential for public exposure to the notified polymer arising from use in automobile primers. There is little chance of public contact with the notified polymer in the

lower paint layers of motor vehicles, and its adhesion to the substrate and the physico-chemical properties of the cured primer will be sufficient to preclude absorption across the skin or other biological membranes. Therefore, based on its use pattern and physico-chemical characteristics, the notified polymer will not pose a significant hazard to public health.

13. RECOMMENDATIONS

To minimise occupational exposure to Polymer in HR-42-8304 the following guidelines and precautions should be observed:

- Employers should ensure that NOHSC exposure standards for all of the components of the final paint mix are not exceeded in the workplace;
- Safety goggles should be selected and fitted in accordance with Australian Standard (AS) 1336 (Standards Australia, 1994) to comply with Australian/New Zealand Standard (AS/NZS) 1337 (Standards Australia/Standards New Zealand, 1992);
- Industrial clothing should conform to the specifications detailed in AS 2919 (Standards Australia, 1987) and AS 3765.2 (Standards Australia, 1990);
- Impermeable gloves or mittens should conform to AS 2161 (Standards Australia/ Standards New Zealand, 1998);
- All occupational footwear should conform to AS/NZS 2210 (Standards Australia/ Standards New Zealand, 1994);
- Spillage of the notified chemical should be avoided. Spillages should be cleaned up promptly with absorbents which should then be put into containers for disposal;
- Good personal hygiene should be practised to minimise the potential for ingestion;
- A copy of the MSDS should be easily accessible to employees;

If the conditions of use are varied from use by industrial automobile manufacturers, greater exposure of the public to the notified polymer may occur. Under such circumstances, further information may be required to assess the hazards to public health.

14. MATERIAL SAFETY DATA SHEET

The MSDS for the notified chemical was provided in accordance with the *National Code of Practice for the Preparation of Material Safety Data Sheets* (National Occupational Health and Safety Commission, 1994a).

This MSDS was provided by the applicant as part of the notification statement. It is reproduced here as a matter of public record. The accuracy of this information remains the responsibility of the applicant.

15. REQUIREMENTS FOR SECONDARY NOTIFICATION

Under the Act, secondary notification of the notified chemical shall be required if any of the circumstances stipulated under subsection 64(2) of the Act arise.

16. REFERENCES

Naas, D. J. (1995) Acute Oral Toxicity Study of PMN 2354 in Albino Rats, Project No. WIL-13075, WIL Research Laboratories, Ashland, Ohio, USA

National Occupational Health and Safety Commission (1994a) National Code of Practice for the Preparation of Material Safety Data Sheets [NOHSC:2011(1994)]. Australian Government Publishing Service, Canberra.

National Occupational Health and Safety Commission (1994b) Approved Criteria for Classifying Hazardous Substances [NOHSC:1008(1994)]. Australian Government Publishing Service, Canberra.

Standards Australia (1987) Australian Standard 2919-1987, Industrial Clothing. Standards Association of Australia, Sydney.

Standards Australia (1990) Australian Standard 3765.2-1990, Clothing for Protection against Hazardous Chemicals Part 2 Limited protection against specific chemicals. Standards Association of Australia, Sydney.

Standards Australia (1994) Australian Standard 1336-1994, Eye protection in the Industrial Environment. Standards Association of Australia, Sydney.

Standards Australia/Standards New Zealand (1992) Australian/New Zealand Standard 1337-1992, Eye Protectors for Industrial Applications. Standards Association of Australia/ Standards Association of New Zealand, Sydney/Wellington.

Standards Australia/Standards New Zealand (1994) Australian/New Zealand Standard 2210-1994, Occupational Protective Footwear. Standards Association of Australia/Standards Association of New Zealand, Sydney/Wellington.

Standards Australia/Standards New Zealand (1998) Australian/New Zealand Standard 2161.2-1998, Occupational protective gloves, Part 2: General requirements. Standards Association of Australia/Standards Association of New Zealand, Sydney/Wellington.