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**NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION  
AND ASSESSMENT SCHEME**

**FULL PUBLIC REPORT**

**Polymer in HR-44-5085**

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**FULL PUBLIC REPORT****Polymer in HR-44-5085****1. APPLICANT**

PPG Industries Australia Pty Ltd of McNaughton Road, Clayton, Victoria, 3168 (ACN 055 500 939) has submitted a limited notification statement in support of their application for an assessment certificate for the new synthetic polymer in HR-44-5085.

**2. IDENTITY OF THE CHEMICAL**

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

**Marketing Names:** HR-44-5085  
E6237, E6176

**3. PHYSICAL AND CHEMICAL PROPERTIES**

The following data relate to the notified polymer at a concentration of 83 % w/w in 4-methyl-2-pentanone, or the notified polymer itself, as indicated. The polymer itself is never isolated from the *in situ* manufactured resin solution.

<b>Appearance at 20°C and 101.3 kPa:</b>	viscous amber liquid (solution)
<b>Boiling Point:</b>	not determined
<b>Specific Gravity:</b>	1.114 (for the solution) 1.21 (calculated, for the notified polymer)
<b>Vapour Pressure:</b>	the notified polymer is not volatile
<b>Water Solubility:</b>	< 10 mg/L at pH 7 and 20°C (notified polymer)
<b>n-octanol Solubility:</b>	0.25 g/L (solution)
<b>Partition Co-efficient (n-octanol/water):</b>	$\log P_{ow} \sim 1.5$ (notified polymer)
<b>Hydrolysis as a Function of pH:</b>	not determined (see comments below)

<b>Adsorption/Desorption:</b>	not determined (see comments below)
<b>Dissociation Constant:</b>	no dissociable groups are present
<b>Particle Size:</b>	not applicable as the polymer is never isolated from solution
<b>Flash Point:</b>	31°C (solution)
<b>Autoignition Temperature</b>	does not autoignite (notified polymer)
<b>Explosive Properties:</b>	not explosive
<b>Reactivity/Stability:</b>	stable at ambient temperatures

### 3.1. Comments on Physico-Chemical Properties

Water solubility was determined for the 83 % polymer solution in 4-methyl-2-pentanone at pH 7 and was less than 10 mg/L (Dix, 1999). As the solvent is completely water soluble at the concentrations present in the test, the result was taken for the polymer itself.

The partition coefficient was estimated to be around 32 ( $\log P_{ow} \sim 1.5$ ) from the estimated solubilities in n-octanol and water (Wells, 1999). Adsorption/desorption data were not presented in the submission, but the notified polymer is not expected to bind to soil or sediment.

The polymer is expected to be stable in water in the environmental pH range (4 - 9).

No flammability data was measured for the notified polymer. The solution in 4-methyl-2-pentanone will be flammable, but the notified polymer will only be imported in a non-flammable aqueous dispersion.

## 4. PURITY OF THE CHEMICAL

<b>Degree of Purity:</b>	> 99 %
<b>Maximum Content of Residual Monomers:</b>	all residual monomers are present at below the cutoff levels for classification of the polymer as hazardous; other reactants used in forming the final polymer dispersion are also below the respective cutoff levels for classification of the polymer as hazardous

**Toxic or Hazardous Impurities:**

The toxic or hazardous impurities and 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.

**Non-hazardous Impurities** none  
(> 1% by weight):

**Additives/Adjuvants:**

<i>Chemical name:</i>	4-methyl-2-pentanone
<i>Synonym:</i>	methyl isobutyl ketone
<i>CAS No.:</i>	108-10-1
<i>Weight percentage:</i>	< 30 % in polymer solution; exact concentration is exempt information
<i>Toxic properties:</i>	eye, mucous membrane and skin irritant (American Conference of Government Industrial Hygienists, 1998)
	NOHSC exposure standard 50 ppm TWA, 75 ppm STEL (NOHSC, 1995)

## 5. USE, VOLUME AND FORMULATION

The notified polymer will not be manufactured in Australia. It will be imported as part of an aqueous coating resin formulation at a concentration of less than 20 % (w/v). The formulated product will be diluted by approximately a factor of two prior to end use. The coating resin formulation will be imported mainly in 20000 L isotanks, but 208 L drums or 1041 L tote tanks will be used for around 10 % of the imported volume.

The polymer will be used as a crosslinking resin 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 250 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 customer sites. The notifier expects that 2 - 6 waterside workers and 2 - 4 warehouse workers, along with an unspecified number of transport drivers, will handle the containers of the coating formulation containing the notified polymer, for approximately 6 hours, 100 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.

### *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 a total of 12 plant operators, 12 plant technical operators and 4 laboratory workers will be exposed to the notified polymer. The exposure is estimated to be for 2 hours per shift, 250 times per year for plant operators, 4 hours per shift, 250 times per year for plant technical operators and 6 hours per shift, 100 times per year for laboratory workers.

The product containing the notified polymer will be transferred by plant operators 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 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 technical operators to the bath contents is possible during sampling. The testing is performed by laboratory personnel. Dermal exposure to small quantities of the bath contents of these workers is also possible.

Exposure may also occur during bath cleaning. The process is continuous with topping up of the electrocoat concentration through the automated system, but bath cleaning will occur every one to two years. The notifier states that the bath contents will be pumped into a storage tank through fixed piping, along with water used to rinse the walls of the tank. Residual washings and sludge will be removed by waste disposal contractors who may have dermal exposure to low concentrations of the notified polymer.

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.

Workers in the electrocoat sections of the car plants 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 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 extremely low.

## **8. ENVIRONMENTAL EXPOSURE**

### **8.1. Release**

Due to the transfer efficiency and material recovery systems inherent to the electrodeposition process, release of the notified polymer is not expected during the coating operation.

Accidental spillage from material transfer processes at customer sites may be a source of release. Any spills would be contained to the plant by bunding, collected and disposed of by licensed waste contractors. The notifier estimates that the maximum amount of spillage would be 1 % per year, which is equivalent to 2500 kg of the notified polymer. Licensed waste contractors could take liquid recovered from a spillage to a liquid waste treatment plant where treatment would result in the notified polymer separating to sludge and either being incinerated or disposed of to landfill. Small spills collected onto absorbent material could be disposed of to landfill.

Large import containers containing residual polymer will be returned to the USA. Polymer released from the washing of small import containers is expected to be up to 3 % of the volume in these containers, equivalent to 750 kg per year (based on 10 % of the total import volume arriving in smaller containers). The notifier states that licensed waste contractors would dispose of this liquid waste, presumably in a similar manner to waste from spills.

Samples withdrawn for quality testing will result in release to the environment of approximately 50 kg/year of the polymer (equivalent to 0.02 %). The notifier indicated that all waste is to be disposed of by licensed waste contractors, presumably in a manner similar to accidental spills.

The notifier indicated that electrodeposition baths are cleaned approximately every one or two years. The process involves transferring the bath contents to a fully enclosed storage tank via permanent piping. Water washing is used to rinse the internal walls of the bath as the contents are transferred. Residual washings and sludge from the bottom of the tank are removed by licensed waste contractors. After collection the waste is treated by flocculation, filtration and centrifugation to separate the solid polymeric material from the water. The water is discharged to the sewer and the sludge is dried and sent to secure landfill. The notifier did not indicate the volume of new polymer likely to be released as a consequence of these operations, but it is estimated that it would be unlikely to exceed 5 % of total imports. This equates to a maximum annual release of around 12.5 tonnes of the notified polymer.

After the polymer has been cross linked into the paint matrix, there is little possibility for release. Any release would be in the form of inert flakes of cured paint.

## 8.2. Fate

Most of the notified polymer becomes part of a durable paint film on the metal surfaces of motor vehicles, and consequently the fate of the majority of the material and the car bodies themselves will be shared. This is likely to be either recycling for metal recovery, or deposition into landfill.

During metal recovery, the organic paint coatings would be destroyed in the high blast furnace temperatures, and the polymer decomposed to water vapour and oxides of carbon and nitrogen. Any material incinerated as a consequence of trade waste disposal operations would be destroyed in a similar manner.

Information on biodegradability was not provided. However, in landfill the cured paint film containing the notified polymer would be expected to be very slowly degraded as a consequence of micro-biological processes with release of gases such as carbon dioxide, methane, ammonia and nitrogen.

No release of the polymer to the water compartment is expected, except in the case of a transport accident. However, in the event of such an accident, the polymer would be expected to settle and associate with the sediment. It would not be expected to cross biological membranes due to its high molecular weight and should not bioaccumulate (Connell, 1990).

If the uncured polymer were released to the soil as result of accidental spills, it would be expected to bind to the soil, and due to its low water solubility would not be mobile. Contaminated soil could then be collected and disposed of to landfill.

## 9. EVALUATION OF TOXICOLOGICAL DATA

Toxicity data are available for the notified polymer as a 81.5 % solution in 4-methyl-2-pentanone. The dose was not corrected for the concentration of active ingredient. No other toxicity data are available.

### 9.1 Acute Toxicity

#### 9.1.1 Oral Toxicity (Kern, 1999)

<i>Species/strain:</i>	rat/Crl:CD <sup>®</sup> (SD)IGS BR
<i>Number/sex of animals:</i>	5/sex
<i>Observation period:</i>	14 days
<i>Method of administration:</i>	gavage; vehicle polyethylene glycol 400; dose volume 10 mL/kg
<i>Dose:</i>	single dose, 2000 mg/kg test substance
<i>Test method:</i>	OECD TG 401



<i>Mortality:</i>	there were no deaths during the study
<i>Clinical observations:</i>	for all animals, various discoloured areas due to discharges (wet or dried brown, red or yellow, around the mouth, nose, forelimbs, base of tail, anogenital or urogenital areas); hypoactivity was observed on the day of dosing for seven animals; abnormal defecation (soft faeces, decreased defecation or diarrhoea) was observed for six animals; hair loss on the forelimbs was noted for one female; apart from the hair loss, all symptoms cleared by day 7
<i>Morphological findings:</i>	at necropsy, one male was found to have small testicles; there were no other gross pathological changes observed
<i>LD<sub>50</sub>:</i>	> 2000 mg/kg
<i>Result:</i>	the test substance was of very low acute oral toxicity in rats

## 9.2 Overall Assessment of Toxicological Data

The acute oral toxicity of the notified polymer as a 81.5 % solution in 4-methyl-2-pentanone is very low. No studies of dermal or inhalation toxicity or skin irritation or sensitisation were provided by the notifier, and the notified polymer cannot be classified for these health effects.

Polymers of high molecular weight do not readily cross the skin or other biological membranes, and the overall toxicity is expected to be low.

## 10. ASSESSMENT OF ENVIRONMENTAL EFFECTS

No ecotoxicological data were submitted.

## 11. ASSESSMENT OF ENVIRONMENTAL HAZARD

Most of the polymer will remain as part of a highly cross-linked paint coating on the metal surfaces of vehicle bodies. At the end of their serviceable lives, vehicle bodies coated with primer containing the notified polymer would be either recycled for metal recovery, or placed into landfill. During the smelting of old vehicle bodies for metal recovery the polymer would be decomposed to water vapour and oxides of carbon and nitrogen. Any polymer incinerated as a result of industrial waste disposal practices would be decomposed in a similar manner. Some polymer may be placed into landfill, either as a coating on old vehicle parts, in waste from spillage, in sludge from coating baths or other losses (estimated to be < 9 % of total imports, or 22.5 tonnes). Although the polymer is not expected to be biodegradable, it is expected that over a prolonged period the polymer would be very slowly degraded by abiotic and biological processes, producing water and oxides of carbon and nitrogen.

No release of the uncured polymer to the water compartment is expected, except in the case of a transport accident. However, in the event of such an accident, the polymer would be expected to settle and associate with the sediment.

The polymer is not expected to be mobile in the soil compartment, and is unlikely to bioaccumulate.

The notified polymer is not likely to present a hazard to the environment when it is stored, transported and used in the proposed manner.

## **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* (NOHSC, 1999). The notified polymer is of very low oral toxicity. Polymers of high molecular weight do not readily cross the skin or other biological membranes, and the overall toxicity is expected to be low. The Material Safety Data Sheets (MSDS) for the imported products ED-6650 and E-6176 Electrocoats list a number of potential health effects due to inhalation, namely nausea, headaches, dizziness, mucous membrane and respiratory irritation and central nervous system depression. These relate mainly to the solvents present in the products rather than the notified polymer. There is also the possibility of skin and eye irritation due to the presence of cationic polymers with surfactant properties in these products.

### *Occupational Health and Safety*

There is little potential for significant occupational exposure to the notified polymer in the transport and storage of the primer components containing this polymer.

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, when samples of the electrodeposition bath are removed for testing to allow the concentration of polymer in the bath to be maintained, and during electrodeposition bath cleaning. 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.

After the car bodies coated with the primers including the notified polymer have been baked and overcoated with additional paint layers, the notified polymer will not be available for exposure.

### *Public Health*

There is little 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 risk to public health.

### 13. RECOMMENDATIONS

To minimise occupational exposure to Polymer in HR-44-5085 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, chemical resistant industrial clothing and footwear and impermeable gloves should be used while handling the product containing the notified polymer; where engineering controls and work practices do not reduce vapour and particulate exposure to safe levels, an air fed respirator should also be used;
- 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;
- A copy of the MSDS should be easily accessible to employees.

If products containing the notified chemical are hazardous to health in accordance with the NOHSC *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 1999), workplace practices and control procedures consistent with State and Territory hazardous substances regulations must be in operation.

Guidance in selection of goggles may be obtained from Australian Standard (AS) 1336 (Standards Australia, 1994) and Australian/New Zealand Standard (AS/NZS) 1337 (Standards Australia/Standards New Zealand, 1992); for industrial clothing, guidance may be found in AS 2919 (Standards Australia, 1987) and AS 3765.2 (Standards Australia, 1990); for impermeable gloves or mittens, in AS 2161 (Standards Australia/ Standards New Zealand, 1998); for occupational footwear, in AS/NZS 2210 (Standards Australia/ Standards New Zealand, 1994a); for respirators, in AS/NZS 1715 (Standards Australia/ Standards New Zealand, 1994b) and AS/NZS 1716 (Standards Australia/ Standards New Zealand, 1994c) and other internationally acceptable standards.

### 14. MATERIAL SAFETY DATA SHEET

The MSDS for products containing the notified polymer were provided in accordance with the *National Code of Practice for the Preparation of Material Safety Data Sheets* (NOHSC, 1994).

The MSDS for E-6176 Electrocoat 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, the director must be informed if any of the circumstances stipulated under subsection 64(2) of the Act arise, and secondary notification of the notified chemical may be

required. No other specific conditions are prescribed.

## 16. REFERENCES

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