

File No: PLC/268

May 2002

**NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION
AND ASSESSMENT SCHEME**

FULL PUBLIC REPORT

Polymer in HC-31-3586 Acrylic Resin

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 National Occupational Health and Safety Commission which also conducts the occupational health & safety assessment. The assessment of environmental hazard is conducted by the Department of the Environment and the assessment of public health is conducted by the Department of Health and Aged Care.

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Copies of this full public report may also be requested, free of charge, by contacting the Administration Coordinator on the fax number below.

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FULL PUBLIC REPORT**Polymer in HC-31-3586 Acrylic Resin****1. APPLICANT**

PPG Australia Pty Ltd of McNaughton Rd Clayton Victoria (ACN 82 055 500 939) has submitted a notification statement in support of their application for an assessment certificate for the synthetic polymer of low concern (PLC) **Polymer in HC-31-3586 Acrylic Resin**.

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.

Marketing names: Polymer in HC-31-3586 Acrylic Resin

3. POLYMER COMPOSITION AND PURITY

Details of the polymer composition have been exempted from publication in the Full Public Report.

4. PLC JUSTIFICATION

The notified polymer meets the PLC criteria.

5. PHYSICAL AND CHEMICAL PROPERTIES

Property	Result	Comments
Appearance	Colourless, viscous liquid	
Boiling point	Not determined.	
Density	975 kg/m ³	
Water solubility	Not determined	There is no water solubility data for the polymer as it is not isolated from the solvent solution. The polymer is expected to be of low solubility in water because it is non-ionic, of high molecular weight and contains hydrophobic aromatic and aliphatic groups.
Particle size	Not applicable	The polymer only exists as a solution.
Viscosity	4500-6000 mPas	For polymer solution
Flammability	Not available for the polymer.	For the polymer solution the flammability limits will be similar to that for the principle solvent, Xylene (1-7%).
Autoignition temperature	Not available for polymer	Autoignition temperature for polymer solution will be similar to that for xylene

		(500°C).
Explosive properties	Not available for polymer	Expected to be stable under normal conditions of use.
Stability/reactivity		The polymer and polymer solution are stable, but like other organic compounds, should be segregated from oxidising compounds.
Hydrolysis as function of pH	Not determined	The notified polymer contains ester linkages that could be expected to undergo hydrolysis under extreme pH conditions. In the environmental pH range of 4 to 9, significant hydrolysis is unlikely to occur due to low solubility.
Partition coefficient	Not determined	Due to the notified polymer's expected low water solubility, it is expected to partition into the organic phase.
Adsorption/desorption	Not determined	As a consequence of its expected hydrophobicity, the notified polymer is likely to associate with the soil matrix and sediments and will be immobile in soil.
Dissociation constant	Not determined	The notified polymer contains a small proportion of carboxylic acid groups, which typically have a pK_a of 4-5.

6. USE, VOLUME AND FORMULATION

Use:

The notified polymer is intended for use as a component in automotive refinish coatings for use on the exterior of car bodies.

Manufacture/Import volume:

The notified polymer will initially be imported, but is expected to be manufactured locally in the future.

Year 1: 10-20 Tonnes

Years 2-5: 20-50 Tonnes

Formulation details:

The notified polymer will initially be imported into Australia as a 51% component of the product HC-31-3586 Acrylic Resin. Alternatively the notified polymer will be manufactured by PPG Industries Australia Pty Ltd at McNaughton Rd Clayton Victoria. Raw materials and solvents will be added to a closed reactor to form the polymer. The polymer solution will then be filtered and filled into 200 L steel drums under exhaust ventilation, and transported to customer sites for use in the manufacture of paint.

The paint is manufactured in mixers fitted with an exhaust ventilation system. The paint is filled into 1 L and 3 L tinplate paint cans under exhaust ventilation. The notified polymer will be present in paint formulations at up to 15% by weight.

The paint will be diluted and applied to automotive panels by spray application and heat cured. The application will take place at about 3000 sites in Australia, in down-draft spray booths.

The notified polymer will be manufactured and used in accordance with the following process:

Polymer solution manufacture

Reactor charged with reactants and solvents ⇒	Polymer manufactured in closed reactor ⇒	Filtration and filling of 200 L drums via a fixed line in a semiautomated process ⇒	Storage for reprocessing
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Paint manufacture

Mixer charged with polymer solution and other reactants by a vacuum pump under exhaust ventilation ⇒	Blending and milling in a high speed mixer which is fully enclosed ⇒	Batch testing and adjustment ⇒	Filtration and filling of 1 L and 3 L cans via a fixed filling line under exhaust ventilation⇒	Storage for distribution
<i>Paint application</i> Mix, stir and dilute paint ⇒	Spray paint object ⇒	Apply top coat ⇒	Heat cure ⇒	Finished article

7. OCCUPATIONAL EXPOSURE

Exposure route	Exposure details	Controls indicated by notifier
<i>Polymer Solution Manufacture (1 site)</i>		
<i>Polymer solution manufacture (3 workers, 8 hrs/day, 10 days/year)</i>		
Dermal and ocular	Possible exposure to drips, spills and splashes when taking and testing samples	Reaction vessel enclosed, coveralls, goggles and impervious gloves worn.
<i>Manufacture and testing of paint (3 workers, 8 hrs/day, 20 days/year)</i>		
Dermal and ocular	Possible exposure to drips, spills and splashes during charging of mixer, during blending and batch adjustment, when taking and testing samples, and during filling of paint cans.	Manufactured in mixers fitted with an exhaust ventilation system. The paint is filled into cans under exhaust ventilation. Coveralls, goggles and impervious gloves worn.
<i>Laboratory testing (1 site)</i>		
<i>Sampling, testing and filling of drums (9 workers, 8 hrs/day, 10 days/year)</i>		
Dermal and ocular	Possible exposure to drips, spills and splashes when taking and testing samples and when connecting filling lines.	Polymer solution is filled into 200 L steel drums under exhaust ventilation, coveralls, goggles and impervious gloves worn.
<i>Paint Formulation (1 site)</i>		
<i>Paint make up (3 workers, 8 hrs/day, 30 days/year)</i>		
Dermal, inhalation and ocular	Possible dermal and ocular exposure to drips, spills and splashes during charging of mixer and blending. Possible inhalation exposure to aerosols during blending.	The paint is manufactured in mixers fitted with an exhaust ventilation system. Coveralls, goggles and impervious gloves worn.
<i>QC testing (3 workers, 8 hrs/day, 30 days/year)</i>		
Dermal and ocular	Possible exposure to drips, spills and splashes during batch adjustment and when taking and testing samples.	Coveralls, goggles and impervious gloves worn.
<i>Filling into drums (3 workers, 8 hrs/day, 30 days/year)</i>		
Dermal	Possible exposure to drips and spills when connecting filling lines.	The paint is filled into cans under exhaust ventilation. Coveralls, goggles and impervious gloves worn.
<i>Maintenance workers</i>		
Dermal	Possible skin contact during equipment maintenance	Coveralls, goggles, gloves

End use (3000 sites)

Thinning and application of paint and cleaning of spray equipment (6000 workers, 4 hrs/day, 220 days/year)

Dermal and inhalation	Possible exposure to drips and spills during preparatory stages of the paint for spraying and cleaning of equipment. Formation of aerosols and therefore inhalation exposure may occur during spray application.	Paint will be diluted and applied in a well ventilated, down draft spray booth with an effective fume extraction system. Anti-static flame retardant overalls, anti-static footwear, impervious gloves, eye protection worn air-fed breathing mask worn.
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Transport and storage

Transport and Warehouse Workers 500 workers, 1hr/day, 240 days/year.

Dermal, inhalation and ocular	In case of spill or leak only	None required normally. Gloves, coveralls and goggles available if required. Respirators may also be used, but due to size of containers may not be necessary.
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Disposal

8. PUBLIC EXPOSURE

Public exposure to the notified polymer as a result of importation, transport, reformulation and application and disposal is considered to be negligible. Once it has been applied to the automobile body, 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 low.

9. ENVIRONMENTAL EXPOSURE

9.1. Release

During polymer and coatings production, up to 800 kg per annum of waste containing the notified polymer will be generated from cleaning up minor spills and quality control testing. Based on a spray transfer efficiency of 30%, up to 70 tonnes per annum of the notified polymer will be disposed of during coating application and up to 2000 kg will remain in empty paint containers.

9.2. Fate

The majority of the notified polymer will be combined with other coating components where heat induces reaction of alcohol with isocyanate groups to form a very high molecular weight and stable coating. Once incorporated into the coating formulation, the notified polymer is expected to be immobile in the environment. As the coating degrades over time, any fragments, chips and flakes of the coating are expected to be inert and will be of little concern. The metal panels and car bodies 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 furnaces and converted to water vapour and oxides of carbon and nitrogen.

The notified polymer in liquid waste from spills, equipment cleaning, spray-booths and on masking material will be treated on-site by flocculation. The resulting solid containing the notified polymer will be dried followed by disposal into landfill while the water will be tested prior to release into the sewer. Empty paint containers and solid wastes from spills and spray booths will also be disposed of in landfill.

As a consequence of its hydrophobic nature, the notified polymer is expected to associate with the soil matrix and sediments and not be mobile in landfill where it will slowly degrade. The notified polymer is not expected to cross biological membranes due to its high molecular weight and is therefore not expected to bioaccumulate (Connell 1990).

10. EVALUATION OF HEALTH EFFECTS DATA

No toxicology data were supplied for the notified polymer.

Constituents	The polymer contains monomers that are hazardous substances at concentrations as low as 1%. These residual monomers occur at concentrations below 0.2%.
Hazardous impurities	None
Additives/adjuvants	None

Solvents

Chemical	Dimethyl benzene (xylene)
Risk Phrases	R:10 Flammable. R:20 Harmful by inhalation. R:21 Harmful in contact with skin. R:38 Irritating to skin.
Exposure Standards	Atmospheric: TWA: 80 ppm. STEL: 150 ppm. (NOSCH,1995)
Remarks	The neat solvent is acutely toxic by inhalation and by skin contact; it is also a skin irritant. It may cause central nervous system depression. The solvent is flammable. Mixtures containing the solvent at or above 12.5% are classified as Harmful (Xn). (NOHSC,1999a)
Chemical	Solvent Naphtha
Exposure Standards	None applicable. However, exposure to solvents in the workplace should be controlled
Remarks	The neat solvent is an aspiration hazard. Mixtures containing the solvent at or above 10% may be classified as Harmful (Xn), depending on the benzene content. (NOHSC, 1999a)
Chemical	n-butyl acetate
Risk Phrases	Not included in <i>List of Designated Hazardous Substances</i> (NOHSC, 1999a).
Exposure Standards	Atmospheric: TWA: 150 ppm. STEL: 713 ppm (NOHSC, 1995)
Remarks	Irritating to respiratory system and skin. Risk of serious damage to eyes. Vapours may cause dizziness or suffocation. The solvent is highly flammable.

11. EVALUATION OF ENVIRONMENTAL EFFECTS DATA

No ecotoxicological data were provided.

12. ENVIRONMENTAL RISK ASSESSMENT

The majority of the notified polymer will be combined with other coating components to form a very high molecular weight and stable coating. Once incorporated into the coating formulation, the notified polymer is expected to be immobile and pose minimal risk to the environment.

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

As a consequence of its hydrophobic nature, the notified polymer is expected to associate with the soil matrix and sediments. The notified polymer is not expected to cross biological membranes due to its high molecular weight and is therefore not expected to bioaccumulate.

13. HEALTH AND SAFETY RISK ASSESSMENT

13.1. Hazard assessment

No toxicological data has been provided on the notified polymer. Since the notified polymer has a NAMW >1000 (NAMW= 4292 with 2.7%<100 and 0.9% <500) absorption across biological membranes is expected to be restricted. As imported, the notified polymer is in a solution containing up to 30% xylene, 30% light aromatic solvent naphtha and up to 10% n-butyl acetate. The MSDS provided for the notified polymer indicates that ingestion of large amounts of the product may cause nausea and inhalation of vapours may cause irritation to the

mucous membranes, headaches, dizziness and possible nausea. The products may also cause skin and eye irritation. These effects are likely to be a result of exposure to solvents rather than the notified polymer. The polymer meets the PLC criteria and is unlikely to be a hazardous substance according to the NOHSC *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 1999b).

Due to the solvents present (21-70 % aromatic hydrocarbon solvent system), the product is classed as a dangerous good, Class 3, flammable liquid and carries the following risk and safety phrases:

Xn (Harmful)

Xi (Irritant)

R20/21 Harmful by inhalation and in contact with skin

R38 Irritating to the skin

S16 Keep away from sources of ignition

S23 Do not breathe vapour

S24/25 Avoid contact with skin and eyes

S26 In case of contact with eyes, rinse immediately with plenty of water and contact a doctor or Poisons Information Centre

The MSDS for the polymer solution HC-31-3586 lists a number of potential health effects. The symptoms described relate mainly to the solvents, xylene, solvent naphtha and n-butyl acetate, rather than the notified polymer.

13.2. Occupational health and safety

The polymer solution is manufactured in a closed reactor and then drummed off for further processing into paint. There is limited scope for exposure during this process. Paint manufacture employs the use of mixers fitted with exhaust ventilation to capture any vapour generated at source. Both polymer and paint are filled into containers under exhaust ventilation to capture any vapour generated.

The final paint mix including the pre-prepared paint component containing the notified polymer could contain a wide variety of additional ingredients. This is likely to introduce human health hazards because, apart from a range of potentially toxic solvents, there may be components containing resins with pendant isocyanate groups. The spraying procedure also produces a dense aerosol, which could adversely affect human health even in the absence of additional hazardous components. It is also probable that professionals involved in the spray painting industry will use a number of different paint formulations.

For these reasons, the polymer in HC-31-3586 must be assessed for the contribution it makes to the hazards associated with spray application of the paint. The presence of many potential and actual hazardous substances in the formulations requires the use of stringent engineering controls, such as a correctly constructed and maintained spray booth, and of a high level of personal protective equipment, such as impermeable overalls and gloves and a full face shield and respirator. The use of the paint containing the polymer should be in accordance with the NOHSC *National Guidance Material for Spray Painting* (NOHSC, 1999c). The level of protection from exposure afforded by the standard protective measures will provide adequate protection from the polymer, which is likely to be less intrinsically toxic than most of the solvents and pigments and also some other paint resins.

Once the applied final paint mix has hardened, the polymer will not be separately available for exposure or absorption.

There are NOHSC exposure standards for xylene and butyl acetate, identified as ingredients in the paint solution containing HC-31-3589. The employer is responsible for ensuring that these exposure standards, and exposure standards pertaining to other final paint mix additives, are not exceeded in the workplace.

The solutions containing the polymer are flammable due to their solvent content. Precautions must be taken to avoid sources of ignition, e.g. use of earthing leads. Operators should wear antistatic overalls and footwear.

Similar considerations apply in the cleaning of spray equipment and disposal of the polymer. The wastes containing the polymer may be hazardous materials on the basis of the solvent and other resin content, and the precautions used for the additional materials should be adequate for protection from the polymer. In addition, much of the polymer will be crosslinked and hardened, and therefore immobile, by the time of disposal.

The polymer itself is of low hazard, and controls are already in place to prevent exposure to other paint components, and to the polymer in particulate form during spraying, therefore the health risk due to the notified polymer is low, and no additional controls are required.

13.3. Public health

The notified polymer is not available for sale to the general public and will be used as a component of automotive paints. Since the notified polymer will be bound to the automobile bodies in an insoluble polymeric matrix, the risk of exposure of the public to the notified polymer is considered to be low.

14. MSDS AND LABEL ASSESSMENT

14.1. MSDS

The MSDS of HC-31-3586 provided by the notifier was in accordance with the NOHSC *National Code of Practice for the Preparation of Material Safety Data Sheets* (NOHSC, 1994a). It is published here as part of the assessment report. The accuracy of the information on the MSDS remains the responsibility of the applicant.

14.2. Label

The label for HC-31-3586 provided by the notifier was in accordance with the NOHSC *National Code of Practice for the Labelling of Workplace Substances* (NOHSC, 1994b). The accuracy of the information on the label remains the responsibility of the applicant.

15. RECOMMENDATIONS

Occupational Health and Safety

- Employers should implement the following engineering controls to minimise occupational exposure to the polymer in HC-31-3586 as diluted for use in paint products:
 - Use of the paint containing the notified polymer should be in accordance with the NOHSC *National Guidance Material for Spray Painting*;
- Employers should implement the following safe work practices to minimise occupational exposure during handling of the polymer in HC-31-3586 as diluted for use in paint products:
 - Use of the paint containing the notified polymer should be in accordance with the NOHSC *National Guidance Material for Spray Painting*;
 - Employers should ensure that NOHSC exposure standards for all of the components of the final paint mix are not exceeded in the workplace.
- Employers should ensure that the following personal protective equipment is used by workers to minimise occupational exposure to the notified polymer and solvents during manufacture of the polymer and paint products:
 - impervious gloves, coveralls and goggles.

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 polymer in HC-31-3586 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.

Secondary notification

The Director of Chemicals Notification and Assessment must be notified in writing within 28 days by the notifier, other importer or manufacturer:

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.

16. REFERENCES

Connell D. W. (1990) General characteristics of organic compounds which exhibit bioaccumulation. In Connell D. W., (Ed) Bioaccumulation of Xenobiotic Compounds. CRC Press, Boca Raton, 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) National Code of Practice for the Labelling of Workplace Substances [NOHSC:2012(1994)]. Australian Government Publishing Service, Canberra.

National Occupational Health and Safety Commission (1995) Adopted National Exposure Standards for Atmospheric Contaminants in the Occupational Environment, [NOHSC:1003(1995)]. In: Exposure Standards for Atmospheric Contaminants in the Occupational Environment: Guidance Note and National Exposure Standards. Australian Government Publishing Service, Canberra.

National Occupational Health and Safety Commission (1999a) List of Designated Hazardous Substances [NOHSC:1005(1999)]. Australian Government Publishing Service, Canberra.

National Occupational Health and Safety Commission (1999b) Approved Criteria for Classifying Hazardous Substances [NOHSC:1008(1994)]. Australian Government Publishing Service, Canberra.

National Occupational Health and Safety Commission (1999c) National Guidance Material for Spray Painting. Australian Government Publishing Service, Canberra.