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NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME

FULL PUBLIC REPORT

Acrylic Polymer in Centari® 5000

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Director
Chemicals Notification and Assessment

FULL PUBLIC REPORT

Acrylic Polymer in Centari® 5000

1. APPLICANT

DuPont (Australia) Ltd of 49-59 Newton Road WETHERILL PARK NSW 2164 has submitted a limited notification statement in support of their application for an assessment certificate for Acrylic Polymer in Centari® 5000.

2. IDENTITY OF THE CHEMICAL

Acrylic Polymer in Centari® 5000 is not considered to be hazardous based on the nature of the polymer and the data provided. Therefore the chemical name, CAS number, molecular and structural formulae, molecular weight, spectral data, details of the polymer composition and details of exact import volume have been exempted from publication in the Full Public Report and the Summary Report.

Trade Name:	Acrylic Polymer in Centari® 5000
Number-Average Molecular Weight:	> 1 000
Maximum Percentage of Low Molecular Weight Species	
Molecular Weight < 500:	> 5%
Molecular Weight < 1 000:	> 10%

3. PHYSICAL AND CHEMICAL PROPERTIES

Appearance at 20°C and 101.3 kPa:	clear, glass-like solid; a solution in butylacetate is clear and syrupy
Melting Point:	does not have a melting point - the glass transition range is 20°C- 50°C
Specific Gravity:	0.95 - 1.05 (estimated - polymer in solution of butylacetate)
Vapour Pressure:	does not vaporise
Water Solubility:	< 30 mg/L (soxhlet extraction)

Partition Co-efficient (n-octanol/water):	not provided
Hydrolysis as a Function of pH:	not provided
Adsorption/Desorption:	not provided
Dissociation Constant:	not provided
Flash Point:	not provided
Flammability Limits:	not provided
Autoignition Temperature:	expected to exceed 250°C
Explosive Properties:	not provided
Reactivity/Stability:	the notified polymer is designed to react with isocyanates in a two pack paint system; the polymer is not expected to react with other substances

Comments on Physico-Chemical Properties

The polymer is amorphous and does not have a true melting point. Rather it has a glass transition range over which the polymer transforms from glass to a rubber. The polymer does not have a boiling point as it decomposes above 200°C before boiling. The specific gravity is estimated from a solution of the polymer in butylacetate.

The polymer does not vaporise. Vapour pressure is more relevant to the solvent system used in the paint containing the resin, eg butyl acetate, acetic acid, 3-ethoxy propionate, xylene and aromatic hydrocarbons.

Water solubility was determined by soxhlet extraction. The extract was analysed by high performance liquid chromatography (HPLC) to determine the extractables, which were found to be less than 30 ppm. Based on this, the notifier claims that by analogy with similar acrylic resins the water solubility would be expected to be much less than 1 ppm. It is noted that while the polymer contains a large amount of low molecular weight species that could in theory lead to an increase in water solubility, none of the monomeric components contain functionalities that would confer water solubility.

The polymer contains several ester sidechains that are susceptible to hydrolysis. However, hydrolysis in the environmental pH range is not expected due to low solubility.

Due to the expected low water solubility, it is expected that the polymer will have a

low partition coefficient. The majority of the polymer is not expected to cross biological membranes due to its high molecular weight, expected low water solubility and partition coefficient (1, 2, 3).

4. PURITY OF THE CHEMICAL

Degree of Purity: > 98%

Maximum Content of Residual Monomers: < 2%

Additives/Adjuvants: none

5. USE, VOLUME AND FORMULATION

The notified polymer will not be manufactured or reformulated in Australia. It will be imported as a component (at a concentration of approximately 10%) of a two pack paint system intended for use by professional spray painters for vehicle repair. Paints containing the notified polymer will not be available to the general public.

The paint system is solvent based, with the notifier claiming that it contains 15% less solvent than previous solvent paint technology.

The notifier states that import quantities of the notified polymer will vary, depending on customer demand, and estimates that the volume of finished paint imported will be up to 25 000 litres per year for each of the first five years. This corresponds to approximately 2 500 kg of the notified polymer.

6. OCCUPATIONAL EXPOSURE

Paint containing the notified polymer will be imported in 0.48 L, 0.95 L and 3.78 L cans. Waterside, warehouse and transport workers are unlikely to be exposed to the notified polymer under normal circumstances.

Workers in motor vehicle repair shops may be exposed to the notified polymer when using two pack paint systems. Part B of these paint systems will contain the notified polymer at a concentration of about 10%. There is the potential for dermal exposure to the notified polymer when workers decant the acrylic and isocyanate parts of the paint into a mixing beaker. There is also potential for dermal, inhalational and ocular exposure to the notified polymer when workers in automotive repair shops apply paints containing the notified polymer using spray painting equipment. Should contact occur during mixing or application, the paint is likely to remain on the skin for some time, hence prolonging exposure.

Workers may also experience dermal, inhalational or ocular exposure to solvent and isocyanate components of the paint systems when mixing and spraying paint

components. The notifier states that exposure to paint components will be minimised in professional spray painting shops by worker training, appropriate work practices and the installation of engineering controls such as exhaust ventilation and/or spray booths.

There may be significant worker contact with dried paints containing the notified polymer, however, the notified polymer will be bound to the paint and will therefore not be bioavailable.

7. PUBLIC EXPOSURE

The potential for public exposure to the notified polymer is considered to be negligible. Paint containing the polymer is applied only by professional spray painters, and after application the polymer reacts to form a cross-linked, insoluble and inert paint film of high molecular weight.

In the case of accidental spillage during transport, the public may be exposed to the notified polymer. This is minimised by the recommended practices for storage and transportation. Emergency procedures for the containment and clean up of accidental spills are available and should be followed.

8. ENVIRONMENTAL EXPOSURE

Release

The two parts of the paint system are mixed immediately prior to application. The mixing is carried out in a single designated mixing beaker that also acts to measure the parts thus eliminating residue in multiple containers. The mixed paint is then poured into the spray equipment for application. Immediately on mixing, the two parts begin cross-linking.

During application, up to 20-50% of the polymer may be lost through overspray (up to 1 250 kg per year of the polymer at maximum import volumes). However, release of the paint will be contained within spray booths. Overspray will be captured and collected through the spray booth's filtering system. Solid residues are trapped in the filter, which is disposed of to landfill when due for replacement.

In approximately 30% of spray shops, a 'wet floor' arrangement is used in place of or in combination with dry filters. In this instance a water trap is used to catch overspray. The water trap is periodically emptied by a waste disposal company for treatment.

Unused mixed paint and wastes generated through the cleaning of mixing gear and application equipment is estimated at 10-20% (up to 500 kg per year of the polymer at maximum import volumes). All liquid waste paint will be disposed of to a waste drum. The material is typically sent to a waste disposal company for solvent recovery. This solidified residue obtained as a result of this process will be disposed of to landfill.

Residues of mixed paint containing the notified polymer remaining in paint cans is estimated by the notifier at 3% (up to 75 kg per year of the polymer at maximum manufacture/import volumes). These residues will dry within the can and be disposed of to landfill. Empty containers, containing uncatalysed paint residues, will be sent to landfill. The notifier states that residues will be minimal and estimates them to be 5% (125 kg per year of the polymer at maximum import volumes).

Fate

The majority of the notified polymer is not expected to be released to the environment until it has been fully cured into a solid polymer matrix. The coating containing the cross-linked polymer will share the fate of the substrate to which it is applied. As part of a polymerised coat, no hydrolysis, movement, biodegradation or bioaccumulation of the polymer is expected.

Incineration of the polymer is expected to produce water and oxides of carbon. Any chips or flakes of the cured paint that occur (due to stone chips, accidents, wear and tear, etc) will be inert, diffuse and form part of the sediments.

9. EVALUATION OF TOXICOLOGICAL DATA

No toxicological data were provided, which is acceptable for polymers of number-average molecular weight (NAMW) greater than 1 000 according to the Act.

The notified polymer has a molecular weight greater than 1 000 and is unlikely to easily cross biological membranes. However, the levels of low molecular weight species are quite high (MW < 1 000, more than 10%; MW < 500, more than 5%), and the levels of residual monomers are around 2%. While a number of these monomers are irritants and/or respiratory sensitisers, the levels are not sufficient to classify the notified polymer as hazardous according to Worksafe Australia criteria (4, 5), even when potential cumulative effects are taken into account. In addition, the concentration of the notified polymer in the end use product is approximately 10%, and levels of low molecular weight species and residual monomers will be correspondingly reduced.

10. ASSESSMENT OF ENVIRONMENTAL EFFECTS

No ecotoxicology data were provided, which is acceptable for polymers of NAMW greater than 1 000 according to the Act.

11. ASSESSMENT OF ENVIRONMENTAL HAZARD

The main environmental exposure of the polymer arises from the landfill disposal of recovered dry waste paint from the mixing and application processes. It is estimated that up to 80% of the polymer may be consigned to landfill at maximum projected import volumes (due to 50% overspray in application, 20% wastage (including cleaning washings) and 8% residue remaining in containers). However, the vast majority of such material will be fully cured and remain immobile in the environment. The environmental hazard from such disposal is expected to be low.

The main environmental hazard would arise through spillage in transport accidents that may release quantities of the uncured polymer to drains and waterways. However, the paint product will be imported in small cans that should limit the size of spills. In the event of a spill, the polymer would quickly become immobile on association with soil/sediment. Adequate control procedures are outlined in the material safety data sheet (MSDS).

The polymer is unlikely to present a hazard to the environment when it is incorporated into paint and applied to the panels of cars. Such painted panels will be consigned to landfill or recycled at the end of their useful life.

12. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY EFFECTS

The occupational health risk posed by the notified polymer to waterside, warehouse and transport workers will be negligible, as they will come in to contact with the notified polymer only in the event of leaking packaging or an accident.

There is a low health risk posed by the notified polymer to workers who will handle paint components while mixing and spraying automobile paints. Based on information provided by the notifier, the polymer is not expected to be hazardous (see above discussion). Residual monomers and low molecular weight species are unlikely to pose a toxicological hazard at the concentrations found in the final paint products.

Exposure to other potentially hazardous components of the two pack paint products may also occur, and appropriate exposure standards (6) should be observed in areas where these paints are being handled and sprayed. Workers should also be aware of the flammable nature of some of these components.

Based on the provided information and the intended usage, Acrylic Polymer in Centari® 5000 does not appear to represent a significant risk to public health.

13. RECOMMENDATIONS

To minimise occupational exposure to Acrylic Polymer in Centari® 5000, the following guidelines and precautions should be observed:

- It is good work practice to wear industrial clothing which conforms to the specifications detailed in Australian Standard (AS) 2919 (7) and occupational footwear which conforms to Australian and New Zealand Standard (AS/NZS) 2210 (8) to minimise exposure when handling any industrial chemical;

- Spillage of products containing the notified polymer 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.

In addition, the Worksafe Australia document *Exposure Standards for Atmospheric Contaminants in the Occupational Environment: Guidance Note and National Exposure Standards* (6) should be used as a guide in the control of workplace exposure to other potentially hazardous paint components, and appropriate personal protective equipment should be worn where necessary to minimise exposure to these chemicals. Workers should also be aware of the flammable nature of some of these components.

14. MATERIAL SAFETY DATA SHEET

The MSDS for a formulation containing the notified polymer was provided in accordance with the *National Code of Practice for the Preparation of Material Safety Data Sheets* (9).

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 polymer shall be required if any of the circumstances stipulated under subsection 64(2) of the Act arise. No other specific conditions are prescribed.

16. REFERENCES

1. Anliker, R., Moser, P. & Poppinger, D. 1988, 'Bioaccumulation of dyestuffs and organic pigments in fish. Relationships to hydrophobicity and steric factors', *Chemosphere*, vol. 17, no. 8, pp. 1631-1644.

2. Connell, D.W. 1989, 'General characteristics of organic compounds which exhibit bioaccumulation', in *Bioaccumulation of Xenobiotic Compounds*, CRC Press, Boca Raton.

3. Gobas, F.A.P.C., Opperhuizen, A. & Hutzinger, O. 1986, 'Bioconcentration of hydrophobic chemicals in fish: relationship with membrane permeation', *Environmental Toxicology and Chemistry*, vol. 5, pp. 637-646.

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

5. National Occupational Health and Safety Commission 1994, *List of Designated Hazardous Substances [NOHSC:10005(1994)]*, Australian Government Publishing Service, Canberra.

6. 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.

7. Standards Australia 1987, *Australian Standard 2919-1987, Industrial Clothing*, Standards Association of Australia, Sydney.

8. 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.

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