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NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME

FULL PUBLIC REPORT

RC 70609

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Director
Chemicals Notification and Assessment

FULL PUBLIC REPORT

RC 70609

1. APPLICANT

Du Pont (Australia) Ltd of 49-59 Newton Road WETHERILL PARK NSW 2164 has submitted a notification statement in support of their application for an assessment certificate of synthetic polymer of low concern for 'RC 70609'.

2. IDENTITY OF THE CHEMICAL

The following information have been exempted from publication in the Full Public Report:

chemical name,
CAS number,
molecular and structural formulae,
molecular weight,
spectral data,
details of the polymer composition,
residual monomers and impurity, and
details of exact import volume and customers.

Trade name: RC 70609

3. PHYSICAL AND CHEMICAL PROPERTIES

Appearance at 20°C and 101.3 kPa: see comments below

Boiling Point: not defined (see comments below).

Specific Gravity/Density: 1 020 ± 50 kg/m^3

Water Solubility: << 1 mg/L (see comments below)

Flash Point: not determined

Flammability: combustible

Autoignition Temperature: not determined

Explosive Properties: not determined

Reactivity/Stability: stable (see comments below)

Comments on Physico-Chemical Properties

The notifier indicated that the polymer exists as a 30-60% resin solution in mixed organic solvents.

The polymer has no well defined melting point, but the notifier indicated that the glass transition temperature (T_g) of the microgel core was determined using differential scanning calorimetry as -1.8°C, while the corresponding T_g for the shell was 72.6°C.

A water solubility study was not submitted. The notifier claims that the notified polymer is estimated to have water solubility very much less than 1 mg/L, and this is reasonable considering the molecular weight, the hydrophobic nature of the polymer and its intended use as a component of paint that will be continuously exposed to all weather conditions.

The notified polymer is of high molecular weight, with the notifier claiming that as a constituent of vehicle finishing paints it is designed to be chemically and environmentally inert. While the new polymer contains pendant ester linkages and other functionalities which are inherently susceptible to hydrolytic cleavage, the polymer will be securely bound into a cured resin matrix in the paint. This will preclude contact between the potentially reactive functionalities and water (as well as other reactants in the environment), and hence the possibility for hydrolysis or other reactions would be extremely small.

The polymer contains no charged groups or functionalities capable of readily ionising. Although hydrolytic cleavage of the ester groups would produce charged carboxylate groups, this is unlikely, due to the hydrophobic nature of the bulk of the polymer. This will inhibit direct contact between water and the susceptible groups. Consequently residual electrical charge on the polymer is expected to be zero.

4. PURITY OF THE CHEMICAL

Maximum Content of Residual Monomers: exempt information

5. USE, VOLUME AND FORMULATION

The notified polymer is a dispersant to keep pigments suspended homogeneously through a paint resin binder, which will be sold under the name of IMRON 574H BINDER. It will be used in spray painting of motor vehicles. It is indicated in the notification that the new paint formulations comprise parts of a new spray painting technology called the Imron system. This system is characterised by high solids content in the uncured paint components together with significantly lower contents of volatile organic solvents (VOCs).

The notified polymer is formulated as a microgel, which is a crosslinked particle swollen by solvent. The notified polymer RC 70609 comprises 45% of the IMRON 574H BINDER formulation, while the final paint mixture may contain up to 24% of the new polymer.

The notified polymer will not be manufactured in Australia, but will be imported from USA as a component of a spray paint tinter formulation in 0.95 and 3.78 L cans. No reformulation will take place in Australia, and the resin solution containing the notified polymer will be sold directly to the end users.

Anticipated annual import quantity for the new RC 70609 polymer over the next five years is less than 50 tonnes per year.

6. OCCUPATIONAL EXPOSURE

Transport, storage and retailing
The paint products will be imported in 0.95 and 3.78 L Dangerous Goods approved cans. Exposure to the notified polymer during transporting, storage and retail processes is unlikely except the cans being breached in an accident.

End-use
The notifier anticipates that the new spray painting system may capture 20% of the Australian heavy vehicle finishing and resurfacing market. initially, the product will be used mainly by original equipment manufacturers (OEM) market, but eventually the paint products including the binder formulations containing the notified polymer could be used by around 800 spray painting businesses, employing around 4 000 qualified spray painters. The professional painters will handle the products containing the notified polymer on a daily basis.

Typically, the spray painter will open the can, adjust the color if necessary, mix the appropriate amounts of the different components into an open container and transfer the paint into a spray gun. After spraying, the spray equipment will be washed with solvents.

The spray painters who will be exposed to the notified chemical will be fully TAFE trained. Typically the spray painter will measure the appropriate amounts of the different components required in a particular formulation into an open container and pour this mixture into a spray gun. The spraying of the automobile will be carried out in a laminar flow downdraft spray booth which is designed to rapidly remove aerosol particles and solvent vapour from the atmosphere. Several possible booth designs may be used. In a dry floor booth, the overspray will be collected in filters contained in the floor of the booth; any unremoved particulates will reach the exhaust stack with the solvent vapours. In a wet floor booth, overspray will collect in a pool of water below the grill floor or in a wet scrubber in the exhaust and will be removed with a filter. The residual solids will be disposed of to secure landfill. The spray booths are subject to AS/NZS/4114.1:1995 *Spray Painting Booths – Design, Construction and Testing* and AS/NZS/4114.1:1995 *Spray Painting Booths – Selection, Installation and Maintenance*.

Residual paint mixture will be washed from the equipment manually, using recycled paint solvent, and the washings will be disposed of by solvent recyclers.

Once residual final paint mixture has dried, the notified polymer will be irreversibly bound within the cured matrix and not separately available for either exposure to workers, or for dermal absorption.

The main exposure routes will be dermal and inhalation. Spray painters will wear appropriate personal protective equipment at all times; gloves and overalls while mixing the paint, and, in addition, a full face shield and respirator while inside the spray booth.

7. PUBLIC EXPOSURE

Paint will only be applied by professional spray painters, therefore public contact will only occur from touching the dried paint film on automobiles. The paint film consists of polymer that has crosslinked to form a continuous polymer film in matrix with pigments and other polymers. There are no chemically reactive polymers in the dried paint film. Consequently, the potential for public exposure to the notified polymer during all phases of its life cycle, is considered to be negligible.

8. ENVIRONMENTAL EXPOSURE

Release

Except in the case of accident, no release or exposure to the environment is expected from this polymer during transportation. The material safety data sheet (MSDS) for the new binder gives adequate instructions for cleaning up such spills.

The notifier has estimated that up to 5% of the paint binder may be left in the tins after use and another 5% may be left in the spraying equipment. However, the major release will be as a consequence of overspray during application. This may be as high as 50% of total paint used, despite the claim that the new material will be used only by qualified professional spray painters. Assuming maximum annual imports of 50 tonnes, around 30 tonnes of the new polymer could be released during spray paint application. It is expected that this release would be on a nationwide basis, so release would be diffuse.

Material left in cans could be expected to be mixed with residual hardener (at least when used in dedicated spray painting shops), and disposed of with the empty containers into landfill. The notifier indicates that paint and solvent residues removed from spray equipment would be collected and reprocessed by a solvent reclamation company. It is assumed that the entrained solids would be recovered during this process and sent to landfill or incinerated.

Paint residues from spray booths (i.e. the overspray) would be in the form of dried aggregates or flakes. These would be captured by air filters as solid waste, or washed away with water and discharged to sewer, possibly after treatment to remove solids. Some dried paint may be captured in air filters, to be combined with other solid waste, removed and placed into landfill by qualified licensed contractors, or incinerated. The company indicates that the preferred method for disposal of waste or unused paint, including those formulations containing the new polymer, is via incineration.

Fate

The notifier indicates that, due to the predominantly hydrophobic nature of the material, any of the uncured binder formulation released during spills would be expected to associate with the organic component of soils and sediments and become assimilated into these materials. Biological membranes are not permeable to polymers of very large molecular size and as such, bioaccumulation of the notified polymer would not be expected if quantities of the uncured polymer were to be released into the water compartment.

Once applied to the metal panels of vehicles, the notified polymer will be incorporated in a hardened paint matrix and bound to the surface of metal panels on vehicles. Any fragments, chips or flakes of the dried paint 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 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, nitrogen and sulfur. When deposited into landfill with used paint tins or on discarded panels, the organic components of the cured paint including the new polymer would be inert and immobile. Nevertheless, they would be expected to be very slowly degraded through the biological and abiotic processes operative in these facilities.

Any of the notified polymer that is released to the sewer would be entrained within particles and flakes of an insoluble cured polymer matrix (paint). The matrix is expected to become associated with the sewer plant sludge, and deposited into landfill or incinerated.

9. EVALUATION OF TOXICOLOGICAL DATA

No toxicity studies were available.

10. ASSESSMENT OF ENVIRONMENTAL EFFECTS

No ecotoxicological data were available.

11. ASSESSMENT OF ENVIRONMENTAL HAZARD

It is possible that up to 60% (i.e. a maximum of 3 000 kg per annum) of the new polymer could be released as a consequence of paint application, but this is expected to be nationwide and hence diffuse. The majority of the material would be encapsulated in a cured polymer matrix and is expected to be insoluble and inert. Most of this solid waste would be deposited into landfill or incinerated.

However, some of the cured waste paint may be released into sewers as a consequence of cleaning spray equipment or wash down of spray booths etc. It would become incorporated into sewerage treatment plant sludge which would eventually be either incinerated or placed into landfill.

The polymer is unlikely to present a hazard to the environment once it has been incorporated into the paint, applied to solid substrates and cured. Such painted objects will be consigned to metal reclamation plants or landfill at the end of their useful lives and the paint containing

the notified polymer will share their fate.

The main environmental hazard would arise through spillage in transport accidents, where small quantities of the polymer may be released to drains and waterways. However, the polymer should quickly become immobile on association with the soil/sediment layer.

The low environmental exposure of the polymer as a result of the proposed use indicates the overall environmental hazard should be low.

12. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY EFFECTS

The notified polymer RC 70609 microgel paint matrix is not expected to cause systemic or acute toxicity because of its high molecular weight rendering it unable to traverse biological membranes and low monomer content. On the limited available data, the notified polymer would not be classified as a hazardous substance according to NOHSC *Approved Criteria for Classifying Hazardous Substances* (National Occupational Health and Safety Commission, 1994a). No adverse health effects have been characterised following human exposure overseas, according to the notifier.

The MSDS for the pre-prepared paint component lists a number of potential health effects, namely skin, eye and respiratory irritation and central nervous system effects. These relate to the solvents and additives in the mixture rather than the notified polymer.

Occupational Health & Safety
Health risk for workers in transporting, storage and retailing is expected to be low unless the cans are damaged and spills occur. However, personal protective safety equipment such as chemically resistant gloves and an electric torch should be carried in transport vehicles, as the product is classified as a Class 3 Dangerous Good.

The final paint mix, including the pre-prepared paint containing the notified polymer, could contain a wide variety of additional ingredients once fully mixed. 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 of paint particles which would 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 notified polymer must be assessed for the contribution it makes to the hazards associated with use of the spray paints. 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 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 notified polymer should be in accordance with the NOHSC *Draft National Code of Practice for Spray Painting* (National Occupational Health and Safety Commission, 1991). The level of protection from exposure afforded by the standard protective measures will provide adequate protection from the notified polymer, which is likely to be less intrinsically toxic than most of the solvents, pigments and 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 n-butyl alcohol, methyl amyl ketone, 2-butoxyethyl acetate, heptane and xylene, identified as ingredients in the pre-prepared paint 574H Imron 5000 Metallic Binder. 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 paint components containing the notified 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 disposal of the polymer. The wastes containing the notified polymer may be hazardous substances on the basis of the solvent and other resin content, and the precautions used on the basis of these additional materials should be adequate for protection from the notified polymer. In addition, much of the polymer will be crosslinked, hardened and immobilised by the time of disposal.

Public Health
Based on the use pattern and physico-chemical characteristics of the notified polymer, it is considered that the polymer will not pose a significant hazard to public health.

13. RECOMMENDATIONS

To minimise occupational exposure to RC 70609 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 work place;
- 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, 1994b);
- Respirator should conform to AS/NZS 1715 (Standards Australia/Standards New Zealand, 1994a);

- 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.

14. MATERIAL SAFETY DATA SHEET

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

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. No other specific conditions are prescribed.

16. REFERENCES

National Occupational Health and Safety Commission (1991) Draft National Code of Practice for Spray Painting. Canberra, Australian Government Publishing Service.

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

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

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

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

Standards Australia (1990) Australian Standard 3765.1-1990, Clothing for Protection against Hazardous Chemicals Part 1 Protection against General or Specific Chemicals. Sydney, Standards Association of Australia.

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

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

Standards Australia/Standards New Zealand (1994a) Australian/New Zealand Standard 1715-1994, Selection, Use and Maintenance of Respiratory Protective Devices. Sydney/Wellington, Standards Association of Australia/Standards Association of New Zealand.

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

Standards Australia/Standards New Zealand (1998) AS/NZS 2161.2:1998 Occupational protective gloves, Part 2: General requirements, Standards Australia/Standards New Zealand.