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**NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION
AND ASSESSMENT SCHEME**

FULL PUBLIC REPORT

Polymer in Coatex 9950

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Director
Chemicals Notification and Assessment

FULL PUBLIC REPORT**Polymer in Coatex 9950****1. APPLICANT**

Rohm and Haas Australia Pty Ltd of 969 Burke Road CAMBERWELL VIC 3124 has submitted a limited notification statement in support of their application for an assessment certificate for Polymer in Coatex 9950.

2. IDENTITY OF THE CHEMICAL

Polymer in Coatex 9950 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: the notified substance will be marketed as a component of Coatex 9950

Number-Average Molecular Weight: > 2 500

Weight-Average Molecular Weight: > 3 500

Maximum Percentage of Low Molecular Weight Species
Molecular Weight < 1 000: < 0.5%

Method of Detection and Determination: infrared spectroscopy

3. PHYSICAL AND CHEMICAL PROPERTIES

Appearance at 20°C and 101.3 kPa: brown liquid (product containing the notified polymer)

Melting Point: < 103°C (calculated)

Specific Gravity:	1.2 (product containing notified polymer)
Vapour Pressure:	not provided
Water Solubility:	completely soluble
Partition Co-efficient (n-octanol/water):	$\log P_{ow}$ is estimated to be no larger than 1.62
Hydrolysis as a Function of pH:	magnesium hydroxide will precipitate out of aqueous solution if the pH is greater than 9.5
Adsorption/Desorption:	not provided
Dissociation Constant:	pK_a is expected to be in the range 4.25 (high ionic strength) to 6.0 (low ionic strength)
Flash Point:	not provided
Flammability Limits:	not provided
Autoignition Temperature:	not provided
Explosive Properties:	not provided
Reactivity/Stability:	polymer is expected to be stable; heating of the polymer to temperatures greater than 177°C may result in the generation of acrylic monomers

Comments on Physico-Chemical Properties

The notified polymer is a high molecular weight solid in solution, so vapour pressure is not applicable.

The company states Coatex 9950 is infinitely dilutable with water. This is consistent with its mainly poly-carboxylate structure. When the product is dried to remove water (around 100°C), the polymer residue is still soluble and can be redissolved. At higher temperatures (> 160°C), cross-linking occurs and water solubility diminishes. A polymer solubility of 650 g/L was used for octanol/water partition coefficient estimation.

Neither the backbone structure nor the carboxyl side groups would be expected to hydrolyse under normal environmental conditions. When the pH is greater than 9.5, magnesium hydroxide precipitates out of the aqueous solution.

$\log P_{ow}$ was estimated based on aqueous molar solubility and average molecular weight. While this technique has been used on low molecular weight chemicals in the past, it is not usually used on higher molecular weight polymers. The very high water solubility of the polymer suggests a low $\log P_{ow}$. The calculated result of $\log P_{ow}$ equals 1.62 is possibly an overestimation because the water solubility is

greater than 650 g/L (the figure used for the calculation).

No information is available for adsorption/desorption. Adsorption is unlikely due to the high solubility, but the polymer does contain ionisable groups and could be expected to bind to cations in soils.

4. PURITY OF THE CHEMICAL

Degree of Purity: > 99%

**Maximum Content
of Residual Monomers:** 0.1%

5. USE, VOLUME AND FORMULATION

The notified polymer will not be manufactured in Australia, and will be imported at a concentration of approximately 30% in an aqueous solution, which will be marketed under the name Coatex 9950. The notified chemical will be used as a dispersant for calcium carbonate slurries and other similar substances. The resulting pigment product may be used in ceramics and paints.

Up to 100 tonnes of the notified polymer will be imported per annum for each of the first five years.

6. OCCUPATIONAL EXPOSURE

Coatex 9950 will be imported in 1 200 L, reusable, double walled plastic containers (totes), which will be fitted with a valve at the bottom. Waterside, warehouse and transport workers will not come into contact with the notified polymer, except in the event of accident or leaking packaging.

Dermal exposure may occur when workers connect a hose to the valve in the bottom of the tote to transfer the Coatex 9950, via a metering system, to a mixing tank containing a calcium carbonate-water slurry. Accidental eye contact may also occur at this stage. The final concentration of the notified polymer in the slurry will be approximately 0.15%.

Inhalational, dermal and ocular exposure to the notified chemical may occur during spray drying and packing of the resultant slurry. However, the notifier states that exposure to the notified polymer is expected to be minimal during spray drying, as this process is highly automated, and will be carried out under local exhaust and general ventilation. The notifier states that the product will be packaged in 25 kg and 1 000 kg bags and that the packaging system is also automated and enclosed. Due to these controls, the notifier states that worker exposure to the notified polymer is not expected to exceed several minutes per shift.

The dried slurry will be sold as a pigment product to paint and ceramic

manufacturers. Dermal, inhalational and ocular exposure to the notified polymer may occur when workers manually cut bags containing the pigment product and transfer the pigment product to a closed mixing vessel for formulation into ceramic and paint products. Transfer may occur by either pouring, in the case of smaller bags, or shovelling/scooping in the case of larger bags. It is anticipated that the pigment product will be used at a concentration of up to 20% in ceramic and paint products. This would result in a maximum final concentration of 0.03% of the notified polymer.

Workers involved in the formulation of the pigment product and the final paint and ceramic products may also be exposed to calcium carbonate in dried form. Inhalational exposure to calcium carbonate may occur when spray drying the pigment product, or handling the pigment product prior to formulation into ceramic and paint products. Exposure times are expected to be short, however, and during pigment formulation and spray drying engineering controls are expected to be in place.

Workers may also come into contact with ceramic and paint products containing the notified chemical. Dermal contact would be expected to be the main route of exposure, for example application of paint products using a roller or brush, or application of liquid glazing products to ceramics. Inhalational exposure to the notified chemical may occur, however, if paints are applied using spray equipment, or if ceramic glazes are supplied in powder form.

Workers may also be widely exposed to cured paints or fired ceramic glazes containing the notified polymer.

7. PUBLIC EXPOSURE

There is negligible potential for public exposure to Coatex 9950 arising from transport or industrial formulation processes.

The dried slurry mixtures are to be used in the manufacture of ceramic products and paints, in which the notified polymer will be present at a concentration of approximately 0.15%. Although public contact may occur with ceramics and paints containing Coatex 9950, the notified polymer is not expected to be bioavailable.

8. ENVIRONMENTAL EXPOSURE

Release

Release during reformulation and packaging of the pigment product is expected to be minimal. The notifier has estimated 5 kg of the notified polymer per year, or 0.005% will be released to the environment through these processes.

The pigment product containing the notified polymer is sold to paint and ceramics manufacturers. These customers are outside the notifier's scope. However, further release of the polymer could be expected through the operations of these

manufacturers through blending, cleaning and repacking operations. In the absence of data, it will be assumed that 1% (0.33 kg per day if reformulation occurs on 300 days per year) of the polymer is released to waste water through these processes.

The notified chemical is likely to be used in ceramics and paints. Quantities for each end use are not known. When used for ceramics, release through end use would be expected to be minimal, as the polymer will be incinerated when ceramics are kiln dried. Release through paint use is expected to be far greater. Assuming 50% of the imported polymer is used in paints, and these are all consumed by domestic users, the following release figures have been determined based on emission estimates in the USES model (2). In the absence of adequate data from the notifier, it will be assumed that the vapour pressure of the polymer is less than 1 Pa.

Release estimates for paints at private use, based on maximum annual importation of 100 tonnes:

Compartment	Release fraction	Volume (per day*)
Air	0.002	0.33 kg
Soil	0.002	0.33 kg
Waste water	0.01	1.67 kg

* Assuming 300 days use per year.

Disposal of paint containers containing the polymer are likely to be through household garbage which will be landfilled. The polymer should remain immobilised in the dried paint matrix, or bound to soils due to its ionisable groups.

Fate

When used in ceramics, it is unlikely the polymer will survive the temperatures used for oven drying. At temperatures over 160°C, the polymer cross-links and becomes insoluble. At temperatures used for oven drying, the polymer is expected to combust.

Polymer incorporated in paints would remain trapped within the polymer matrix. Any polymer released to sewer through paint washings could be expected to chelate to cations in the sewage treatment plant, or bind to sludge, where it will be removed and incinerated or landfilled.

Should any free polymer be contained in landfill it would not biodegrade to a significant degree. Due to the ionisable nature of the polymer, it would be expected to bind to cations within the soil, and become immobilised.

The polymer will decompose to acrylic monomers at temperatures above 177°C, and thermal degradation of the polymer takes place above 290°C. If combustion is incomplete, acrylic monomers could be produced.

No bioaccumulation of the polymer is expected because of its high water solubility and its high molecular weight, which is likely to inhibit membrane permeability and prevent uptake during exposure.

9. EVALUATION OF TOXICOLOGICAL DATA

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

10. ASSESSMENT OF ENVIRONMENTAL EFFECTS

No ecotoxicological data were provided for the notified polymer, which is acceptable for polymers of NAMW greater than 1000 according to the Act.

Acrylic polymers are moderately toxic to green algae, inhibiting growth through overchelation of nutrients. One of the constituent monomers appears to be potent in its ability to chelate nutrient elements and may exhibit toxic effects at concentrations greater than 1 ppm (3). However, toxicity is known to be mitigated by salt formation (this polymer is in this form) and humic acid.

11. ASSESSMENT OF ENVIRONMENTAL HAZARD

A worst case predicted environmental concentration (PEC) has been derived based on the following assumptions:

1. All reformulation and end use occurs over 300 days per year;
2. All releases occur from one point source, so is released to one sewer (even though the release figure for end use provided earlier is continental);
3. No chelation of the polymer or removal through adsorption to sludge occurs in the sewage treatment plant (STP);
4. Sewer output is 250 ML per day.

Combining all estimated releases from reformulation and end use when incorporated in paints, a daily release of 2.02 kg is derived. This gives a PEC of 8.1 µg/L (ppb) prior to dilution in receiving waters and suggests the polymer will pose a low environmental hazard.

The company has submitted a label and a Material Safety Data Sheet (MSDS) for Coatex 9950 which has adequate recommendations for disposal and handling accidental spillage.

12. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY EFFECTS

With a NAMW greater than 1 000, the notified polymer is unlikely to cross biological membranes and cause systemic toxicity. The proportion of low molecular weight species in the notified polymer is low (less than 0.5% of the polymer species have a molecular weight less than 1 000). These low levels may be absorbed following dermal contact, although the low molecular weight species should not be of toxicological significance. The levels of residual monomers present in the notified polymer (0.1%) should also not represent a toxicological hazard, as they are well

below concentration cutoffs recommended by Worksafe Australia's *List of Designated Hazardous Substances* (1).

The occupational health and safety risk posed to waterside and transport workers is expected to be negligible, due to the expected low hazard posed by the notified polymer, as discussed above, and the fact that exposure will only occur in the event of an accident or leaking packaging.

The group of workers most likely to be exposed to the notified polymer are those involved in reformulation of Coatex 9950 (which contains the notified polymer at a concentration of approximately 30%) into the pigment product. The MSDS supplied by the notifier for Coatex 9950 indicates that dermal or accidental eye contact may cause slight irritation, based on tests performed on rabbits with a similar product. Inhalational exposure to the notified polymer may occur while spray drying the pigment product, and the MSDS indicates that inhalational exposure to vapour or mist of Coatex 9950 may cause headache, nausea and irritation. However, the concentration of the notified polymer in the pigment product at this stage of the process is 0.15%, and engineering controls will reduce worker exposure to only several minutes per shift. The packing process is also largely automated and enclosed, therefore the occupational risk posed by the polymer during reformulation processes is low.

Dermal and inhalational contact will be the main forms of exposure for workers who will be reformulating the pigment product (containing the notified polymer at a concentration of 0.15%) into ceramic and paint products. The low concentration of the polymer and the expected low toxicity indicates that the health risk posed to these workers is likely to be low.

Workers involved in formulation and spray drying of the pigment product as well as workers involved in formulation of paint and ceramic products may be inhalationally exposed to potentially hazardous levels of calcium carbonate dust. Exposure to calcium carbonate is expected to be minimal if appropriate engineering controls are in place, however the Worksafe Australia document *Exposure Standards for Atmospheric Contaminants in the Occupational Environment: Guidance Note and National Exposure Standards* (4) should be used as a guide in the control of workplace levels of this potentially hazardous substance.

There is a low occupational health risk for workers who may use paints or ceramic products containing the notified polymer. Once the paints have cured, or the ceramics have been fired, the health risk to workers will be negligible.

There is negligible potential for public exposure to the Polymer in Coatex 9950 arising from transport or industrial processes. There may be public contact with ceramic and paint products containing Coatex 9950. The concentration of the notified polymer in ceramic and paint products will be low (approximately 0.03%), and, after firing or drying, the polymer will not be bioavailable. This, combined with the high NAMW, low concentration of species with a molecular weight less than 1 000, and low levels of residual monomers, indicates that there should not be a significant public health risk.

13. RECOMMENDATIONS

To minimise occupational exposure to Polymer in Coatex 9950 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 (5) and occupational footwear which conforms to Australian and New Zealand Standard (AS/NZS) 2210 (6) 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* (4) should be used as a guide in the control of calcium carbonate dust generated while formulating or using the pigment product containing the notified polymer. Workplace monitoring for calcium carbonate dust should be carried out on a regular basis.

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* (7).

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

1. National Occupational Health and Safety Commission 1994, *List of Designated Hazardous Substances* [NOHSC:10005(1994)], Australian Government Publishing Service Publ., Canberra.
2. USES 1994, *Uniform System for the Evaluation of Substances, version 1.0*. National Institute of Public Health and Environmental Protection, Ministry of Housing and Spatial Planning and the Environment, Ministry of Welfare, Health and Cultural Affairs. Distribution no. 11144/150, The Hague, The Netherlands.
3. Nabholz J.V., Miller P., Zeeman M. 1993, 'Environmental Risk Assessment of New Chemicals Under the Toxic Substances Control Act (TSCA) Section Five', in *Environmental Toxicology and Risk Assessment*, ASTM STP 1179. G. Landis, J.S. Hughes, M.A. Lewis (eds). American Society for Testing and Materials, Philadelphia. pp 40-45.
4. 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 Publ., Canberra.
5. Standards Australia 1987, *Australian Standard 2919-1987, Industrial Clothing*, Standards Association of Australia Publ., Sydney.
6. Standards Australia/Standards New Zealand 1994, *Australian/New Zealand Standard 2210-1994, Occupational Protective Footwear*, Standards Association of Australia Publ., Sydney, Standards Association of New Zealand Publ, Wellington.
7. 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.