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NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME

FULL PUBLIC REPORT

Acrylic Copolymer in Orotan 165A

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Director
Chemicals Notification and Assessment

FULL PUBLIC REPORT

Acrylic Copolymer in Orotan 165A

1. APPLICANT

Röhm and Haas Australia Pty Ltd of 969 Burke Road CAMBERWELL VICTORIA 3124 has submitted a limited notification statement with their application for an assessment certificate for Acrylic Copolymer in Orotan 165A. The notified chemical will be used as a pigment disperser in paints.

2. IDENTITY OF THE CHEMICAL

The notified chemical contains no hazardous impurities at levels necessary to classify it as a hazardous substance (1). Therefore, information on the purity of the chemical, the chemical name, CAS number, molecular and structural formulae has been exempted from publication in the Full Public Report and the Summary Report.

Other names:	acrylic copolymer
Trade names:	component of Orotan 165A, Tamol 165
Maximum percentage of low molecular weight species (molecular weight < 1000):	negligible (and unreacted monomers)
Method of detection and determination:	Gel Permeation Chromatography (GPC) and Nuclear Magnetic Resonance Spectroscopy (NMR)

3. PHYSICAL AND CHEMICAL PROPERTIES

Appearance at 20°C and 101.3 kPa:	clear amber liquid (emulsion formulation)
Odour:	ammonia (emulsion formulation)
Melting point	not applicable; expected for emulsion 0^{o}C (water)
Boiling point:	not applicable to a high molecular weight polymer; expected 100^{o}C (water); emulsion may splatter

	above 100ºC. At elevated temperatures (> 177ºC) acrylic monomers may be generated
Specific gravity:	calculated as 1.5 g/ml
Vapour pressure:	not applicable, expected to be 17 mm Hg for emulsion (water) and negligible for polymer.
Water solubility:	not available for the high molecular weight polymer, but expected to be low based on the polymer composition.
Fat solubility:	not available
Partition co-efficient (n-octanol/water) log P_{ow}:	not available
Hydrolysis as a function of pH:	not available
Adsorption/desorption:	not available
Dissociation constant:	pKa is expected to be 4.87
Flash point:	not flammable
Flammability limits:	not flammable
Combustion products:	the dried polymer will burn in a general fire releasing carbon monoxide, carbon dioxide incomplete combustion may yield acrylic monomers.
Pyrolysis products:	not available
Decomposition temperature:	> 177°C
Decomposition products:	not available
Autoignition temperature:	not available
Explosive properties:	not explosive
Reactivity/stability:	not reactive
Particle size distribution:	not applicable, liquid

- **Comments on physico-chemical properties**

No hydrolysis data was available for the notified polymer. This polymer is expected to be stable under normal environmental conditions. Hydrolysis of the ester is expected under extreme acidic or alkaline conditions. Water is used as a solvent/storage medium and hydrolytic stability is expected for the polymer.

Partition coefficient data is not applicable as a polymer of this molecular size (number-average molecular weight (NAMW) > 1000) is not expected to cross biological membranes. No measurement of adsorption/desorption were made. The notifier has indicated that they expect very low mobility in soil and exudation and leaching is not considered likely. The polymer may be expected to bind to soil and be immobile.

Melting point not determined as polymer softens and flows over a wide temperature range. Thermal decomposition occurs if heated to a temperature in excess of 177^{o}C. This is dependent on time and temperature and may yield acrylic monomers. Incomplete combustion may again yield acrylic monomers.

4. PURITY OF THE CHEMICAL

Degree of purity:	> 90%
Toxic or hazardous impurity/impurities:	< 10%
Non-hazardous impurity/ impurities (> 1% by weight):	none
Maximum content of residual monomers:	< 10%
Additives/Adjuvants:	imported polymer emulsion containing the notified Acrylic Copolymer in Orotan 165A also contains:
Chemical name:	ammonia
CAS No.:	7664-41-7
Weight percentage:	max 0.1%
Chemical name:	water
Weight percentage:	> 50%

5. INDUSTRIAL USE

The notified chemical is not manufactured in Australia but will be imported as a polymer emulsion, Oraton 165A Dispersant. The emulsion will be imported in 200 litre drums and sold directly to customers of Röhm and Haas Australia without repackaging. It will be used by the customers as a pigment disperser in paints and coatings at an approximate level of 1%. These products will primarily be used for coating timber and masonry surfaces. It will be marketed towards both industrial and domestic users.

The estimated import quantity for the first five year period is < 100 tonnes/annum.

6. OCCUPATIONAL EXPOSURE

The notified chemical is imported as an emulsion in 205L drums. It is supplied direct to Röhm and Haas's customers in this form, there is no repackaging. The four major customers are located in NSW, Victoria and Queensland, the drums will be distributed via land transport. The potential for exposure to transport personnel is only likely if accidental release of the emulsion from the drums occurs.

The emulsion containing the notified chemical will be formulated into paint at the reformulation plants of Röhm and Haas's customers. At each site approximately 12 personnel will be exposed to either the emulsion or the final product (1% Orotan 165A). Employees who have the greatest potential exposure are those involved in the blending of the emulsion with the other ingredients of the final paint formulation. The five staff involved in the blending procedure at each site will be exposed for 6-8 hours/day for 12 days/year. Other personnel will be exposed for shorter time periods (QC staff) or only to the final formulation (drum/can fill operators). The blending process occurs in a closed blending pot. Local exhaust ventilation is employed during sampling, blending pot filling and container filling.

The final formulation will be used by painters. The notifier estimates this group as under 3000. As the polymer is available in liquid form, skin and eye contact will be the main sources of occupational exposure during the paint formulation and during application of the end product. Inhalational exposure during blending and packaging activities is expected to be low as local exhaust ventilation is used. Inhalational exposure during paint application, however, will be significant if the paint is applied as a spray and respiratory protection is not used. Exposure standards are listed for a component of the imported formulation, ammonia which is present at a level of 0.1%. The exposure standards are unlikely to be exceeded during reformulation and with a further reduced risk during application of the final product as ammonia will be at a concentration of approximately 0.002%.

7. PUBLIC EXPOSURE

There is little potential for public exposure to the notified polymer during storage, transport and formulation into paint products. Minor public exposure to the uncured form of the notified chemical may result from accidental spillage during formulation, transport and storage. Disposal of the chemical after accidental spillage is expected to be carried out in accordance with existing regulations which will minimise public exposure.

The notified chemical will initially be supplied to four customers who will blend the polymer emulsion with other compounds into paint and surface coatings at a final concentration of about 1% Oraton 165A. The finished paint is packaged into 205L, 20L and 1L containers which will be marketed for industrial and domestic use as a masonry and wood coating. There is some potential for public exposure arising from the use of the domestic paint products.

Production losses of the finished coatings at each formulation plant are expected to be about 10%, and a similar level of loss is calculated to occur during application of the finished coatings arising from application inefficiencies, cleaning of equipment and residues in containers. Some of these residues/washings will enter the sewers and drains, while most will be disposed of to liquid or solid waste disposal facilities in accordance with local regulations.

The chemical will finally be immobilised as part of a cross-linked hardened paint film and there will be significant public contact with the notified chemical in this inert form.

8. ENVIRONMENTAL EXPOSURE

. Release

The notified polymer is imported in sealed drums and no release to the environment is expected during storage at Röhm and Haas facilities. Spills of the emulsion containing the polymer can be easily contained by inert materials such as sand or earth and disposed of by incineration.

At formulation sites the notified material will be used in the production of paints and coating material. Production of such coatings is carried out in closed systems then transferred by automatic packaging systems into containers for retail sales. Production losses for similar types of surface coatings and paints can be up to 10% with losses arising from residues in drums and storage containers, transfer pipes, blending tanks, samples and filters.

Residual material in transfer lines is flushed with water and containers, including drums, are washed. Where possible, this collected polymer emulsion is reused in subsequent batches, otherwise the residue is polymerised and disposed of to landfill according to local, state and federal regulations.

The formulated product is intended for both industrial and domestic use and will contain 1% of the acrylic copolymer emulsion Orotan 165A. Application to surfaces

is by either spray equipment, brush or roller and excess material is recovered for later use. During application some loss of formulated product is anticipated but this is expected to be < 10% under normal circumstances. Residual paints and equipment are generally cleaned using tap water and waste disposed of to sewer. Empty cans containing small amounts of residual paint or surface coating are expected to be disposed of to landfill.

Total losses of the notified substance are expected to be a maximum of 10%. The concentrated liquid and solid residues are expected to be disposed of by either incineration or landfill and may be in a pretreated, polymerised form.

. Fate

The notified polymer is intended to be bound to timber and masonry surfaces. In its final form the polymer will be a part of a cross-linked hardened film. Any fragments, chips or flakes of the cured paint would be of little concern as they are expected to be inert and spray droplets are expected to dry to inert particles. Articles coated with the polymer may be reused and the polymer film may be removed by either mechanical or chemical means or may be burned from the surface.

The highest environmental exposure of the uncured notified polymer is likely to be directly from spillage and is expected to be incinerated or sent to approved landfill sites, possibly pretreated. Combustion products would include oxides of carbon and water. Incomplete combustion may yield acrylic monomers. In landfill the polymer is expected to slowly cure and crosslink or to bind to soil and be immobile.

Exposure to the uncured polymer following formulation is expected to be as a residue in cans disposed to landfill. It is expected that residues will be cured rapidly in landfill and therefore have a low mobility in the soil and limited effects. The formulated material may be expected to bind to soil and be immobile. Once cured exudation and leaching are not considered likely.

Formulated product disposed of to sewer from cleaning of application equipment is expected to partition to the sludge.

The insoluble nature of the cured polymer will ensure any hydrolysis or breakdown that may occur will be at an extremely low rate under normal environmental conditions and the polymer should undergo limited biodegradation. No bioaccumulation of the polymer is expected because of the type of application and because its very large molecular size is likely to inhibit membrane permeability and prevent uptake during accidental exposure (2,3).

9. EVALUATION OF TOXICOLOGICAL DATA

The notified chemical has a NAMW of > 1000 therefore there is no requirement to supply toxicological data and none was supplied for this assessment.

The high molecular weight (> 1000) means the notified chemical is unlikely to pass biological membranes and cause systemic effects. The polymer contains a number of hazardous impurities/residual monomers which are included in the list of designated hazardous substances [NOHSC:10005(1994)] (1), they are present at levels well below the cut-off concentrations necessary to classify the polymer as a hazardous substance. They are not expected to cause any significant toxicological concerns. The two residual monomers not listed (1), are at concentrations of 1% or less in the imported formulation, there is no reason to predict a significant toxicological hazard at these levels.

10. ASSESSMENT OF ENVIRONMENTAL EFFECTS

Ecotoxicological data are not required for polymers of NAMW > 1000 according to the Act as they are not transported readily across membranes and therefore cannot affect living organisms. Polymers with free carboxylic acid functions are known to be moderately toxic to green algae, especially those with large numbers of free carboxylic acids. Toxicity values range from 1 - 100 ppm, depending on the number of free carboxylic acids. The most potent structure for poly(carboxylic acid) polymers is paired acids which are equal distant from the polymer backbone and which have one acid on alternating carbons (4). Based on the structure of the notified polymer it may be presumed to be slightly toxic to green algae.

11. ASSESSMENT OF ENVIRONMENTAL HAZARD

The polymer is unlikely to present a hazard to the environment when stored, mixed and applied to products as described. Due to the end use application and the high molecular weight of the polymer it is unlikely to be hazardous to aquatic organisms. It is also expected to be strongly bound to the surface and other components of the coating mixture. It is unlikely to be released into the environment under normal conditions.

A Material Safety Data Sheet (MSDS) has been provided and contains adequate warnings in regard to protection of the environment, containment and disposal of spillage. The MSDS contains adequate instructions for containing and disposing of material spilt as a result of accident during transport. The environmental hazard from spills should be low.

The overall environmental hazard from the use of the polymer is expected to be minimal.

12. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY EFFECTS

Submission of toxicological data is not required for polymers of NAMW> 1000. The notified substance has a very low level of polymers with NAMW < 1000 and also a low level of impurities/residual monomers. The high molecular weight indicates that the notified chemical will be poorly absorbed across biological membranes into tissues. The physico-chemical properties include negligible volatility under normal ambient conditions and a boiling point expected (for the emulsion) of approximately 100^{o}C. These factors support the notifier's claim of expected low toxicity for the chemical. The purity of the notified substance is > 90%. These impurities indicate that the notified substance poses a small risk for eye and skin irritation if exposure to the uncured substance occurs.

Occupational exposure will be limited to formulations containing the notified chemical. It is not manufactured in Australia and will only be imported as a component of an emulsion. Potential exposure to the emulsion formulation will occur during blending to produce the final product, packaging and paint application. Exposure, during transport of the polymer emulsion to the paint manufacturing facilities, will only occur through accidental leakage of the drums.

Exposure in the reformulation plant will be limited as most of the blending is undertaken in closed blending vessels and/or in areas with local exhaust ventilation. Respiratory protection is specified if there is a likelihood of the TWA is exceeded for ammonia, a component of the formulation. The main occupational exposure pathways to the notified chemical, during reformulation and use of the final product, are likely to be skin, eye and inhalational. Exposure to the notified chemical will be significant if the paint formulation is sprayed rather than brushed. However the concentration of the notified polymer is low, so exposure to it will be limited.

On the basis of an assessment of the chemical composition and physico-chemical characteristics of the notified chemical, it would not be classified as hazardous according to the criteria of Worksafe Australia (5). There was no toxicological data submitted to confirm this.

13. RECOMMENDATIONS

To minimise occupational exposure to the Acrylic Copolymer in Orotan 165A the following guidelines and precautions should be observed:

- If engineering controls and work practices are not sufficient to reduce exposure a safe level the following personal protective equipment should be used:

  the appropriate respiratory device should be selected and used in accordance with Australian Standard/ New Zealand Standard (AS/ NZS) 1715 (6) and should conform to AS/NZS 1716 (7).

eye protection (chemical goggles or face shields) should be selected and fitted in accordance with Australian Standard (AS) 1336 (8) and meet the requirements of AS/NZS 1337 (9).

industrial clothing must conform to the specifications detailed in AS2919 (10).

Impervious industrial gloves should conform to the standards detailed in AS 2161 (11).

- A copy of the MSDS should be easily accessible to employees.

14. MATERIAL SAFETY DATA SHEET

The MSDS for the polymer emulsion product containing the Acrylic Copolymer in Orotan 165A was provided in a suitable format.

This MSDS was provided by Röhm and Haas Australia Pty Ltd as part of the notification statement. The accuracy of this information remains the responsibility of Röhm and Haas Australia Pty Ltd.

15. REQUIREMENTS FOR SECONDARY NOTIFICATION

Under the Act, secondary notification of Acrylic Copolymer in Orotan 165A 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, [NOHSC:10005(1994)] 1994. *List of designated hazardous substances,* AGPS, Canberra.

2. Anliker *et al.* 1988. *Chemosphere*, **17**, 1631-1644.

3. Gobas *et al.* 1986. *Environmental Toxicology and Chemistry*, **5**, 637-646.

4. Nabholz J.V., Miller P. and 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. Landis, G., Hughes, J.S. and Lewis M.A. (eds). American Society for Testing and Materials, Philadelphia. pg 49-50.

5. National Occupational Health and Safety Commission, [NOHSC:1008(1994)],1994. *Approved Criteria for Classifying Hazardous Substances,* AGPS, Canberra.

6. Standards Australia, Standards New Zealand, 1994. *Australian/New Zealand Standard 1715 - 1994 Selection, Use and Maintenance of Respiratory Protective Devices*, Standards Association of Australia Publ., Sydney,

Australia, Standards Association of New Zealand Publ., Wellington, New Zealand.

7. Standards Australia, Standards New Zealand, 1991. *Australian/ New Zealand Standard 1716 - 1991 Respiratory Protective Devices,* Standards Association of Australia Publ., Sydney, Australia, Standards Association of New Zealand Publ., Wellington, New Zealand.

8. Standards Australia, 1994. *Australian Standard 1336-1994, Recommended Practices for Eye Protection in the Industrial Environment*, Standards Association of Australia Publ., Sydney, Australia

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

10. Standards Australia, 1990 Australian Standard 3765 - 1990. *Clothing for Protection Against Chemical Hazards*, Part 1, *Protection against General or Specific Chemicals*; Part 2, *Limited Protection Against Specific Chemicals*, Standards Australia Publ., Sydney, Australia.

11. Standards Australia, 1978. *Australian Standard 2161-1978, Industrial Safety Gloves and Mittens (excluding Electrical and Medical Gloves*), Standards Association of Australia Publ., Sydney, Australia.