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NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME

FULL PUBLIC REPORT

Polymer Latex 4783/47

This Assessment has been compiled in accordance with the provisions of *the Industrial Chemicals (Notification and Assessment) Act 1989,* and Regulations. This legislation is an Act of the Commonwealth of Australia. The National Industrial Chemicals Notification and Assessment Scheme (NICNAS) is administered by Worksafe Australia which also conducts the occupational health & safety assessment. The assessment of environmental hazard is conducted by the Commonwealth Environment Protection Agency and the assessment of public health is conducted by the Department of Health and Family Services.

For the purposes of subsection 78(1) of the Act, copies of this full public report may be inspected by the public at the Library, Worksafe Australia, 92-94 Parramatta Road, Camperdown NSW 2050, between the hours of 10.00 a.m. and 12.00 noon and 2.00 p.m. and 4.00 p.m. each week day except on public holidays.

Under subsection 34(2) of the Act the Director of Chemicals Notification and Assessment is to publish this Report in the Chemical Gazette on 7 May 1996.

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Director
Chemicals Notification and Assessment

FULL PUBLIC REPORT

Polymer Latex 4783/47

1. APPLICANTS

Dulux Australia, McNaughton Road CLAYTON VICTORIA 3168 and Rohm and Haas Australia, 969 Burke Road CAMBERWELL VICTORIA 3124 have submitted a notification statement in support of the assessment of a synthetic polymer of low concern, Polymer Latex 4783/47.

2. IDENTITY OF THE POLYMER

Trade name:	polymer latex 4783/47
Molecular formula:	not available, polymer is a complex of polymeric substances
Structural formula:	not available, is a random co-polymer
Number-average molecular weight (NAMW) :	>1000

3. PHYSICAL AND CHEMICAL PROPERTIES

The notified polymer will be manufactured in Australia as a 43% latex dispersion in water, with minor additives between 1-9% and ammonia <1%. All physico-chemical properties relate to the polymer dispersion and not the polymer itself unless indicated otherwise.

Appearance at 20°C and 101.3 kPa:	the polymer itself is never isolated; the polymer dispersion in water is a milky white liquid
Melting Point:	not applicable, polymer in manufactured as a dispersion and is never isolated
Specific Gravity:	1.14
Water Solubility:	< 1mg/L at 20°C
Flammability Limits:	not applicable as the polymer is never isolated from its dispersion in water the polymer latex in water is not flammable

Autoignition Temperature:	not applicable as the polymer is never isolated from its dispersion in water; the polymer latex in water is not flammable
Explosive Properties:	the polymer latex in water is stable and so does not demonstrate explosive properties
Reactivity:	the polymer latex in water is stable and has no oxidation potential
Particle size distribution:	not applicable, polymer dispersion in water

Comments on physico-chemical properties

Melting and boiling points were not provided as the polymer is manufactured within water and remains as an aqueous emulsion. The polymer is insoluble and is stabilised against separation from the aqueous phase.

The notifier states that the polymer contains a low level of carboxyl groups which may ionise under strong base conditions, but has provided a literature reference that the shape of the polymer is such that the carboxyl groups are not exposed and therefore will not ionise under normal conditions. The notifier also states that when incorporated into paint the polymer is bound and the carboxyl groups are unable to ionise.

4. PURITY OF THE CHEMICAL

Purity: > 99.9%

5. INDUSTRIAL USE

The notified chemical will be manufactured as a polymer dispersion at about 43% in water. The notified chemical will be used by both industry and the general public as a film forming polymer in architectural coatings. The amount of Polymer Latex 4783/47 to be manufactured will start at 300 tonnes per annum for the first year rising to 1500 tonnes per annum by the third year and after.

6. OCCUPATIONAL EXPOSURE

The notified chemical will undergo laboratory development at one site in testing the manufacturing process and application of the polymer and the paint formulations it will be incorporated into. The actual manufacture of the notified chemical under laboratory conditions is a smaller scale of commercial manufacturing procedures described below, involving two workers being potentially exposed to the notified chemical for a maximum of 8 hours a day for 15 days per year. The majority of the work involves the manual manufacture of the notified chemical in fumehoods on a very small scale although there is some work done with a small scale reactor. There will also be laboratory based paint manufacture and testing done on a smaller scale to the larger commercial manufacturing process. This will be performed by three workers being potentially exposed to the notified chemical for a maximum of 8 hours a day for 30 days per year. All laboratories will have fumehoods and local exhaust ventilation.

The commercial manufacturing process for the polymer will occur at two sites and will involve the automatic transfer of the required reactants and water into a closed reactor system for the manufacture of the polymer as a 43% dispersion in water. This process will not involve exposure of the notified chemical to any worker. After manufacture the notified chemical will be filtered and filled into drums or into pallecons or bulk containers. This stage will involve the potential exposure of sixteen workers involved in the sampling, testing and filling of the polymer dispersion. Exposure would be for a maximum of 8 hours a day, 100 days per year. Local exhaust ventilation will be utilised.

The notified chemical will be transported to sites of paint manufacture by either road or rail in drums, 1100 L pallecons or bulk containers. There should be no exposure to the notified chemical except in the event of a spill.

The commercial manufacture of the paint containing the notified chemical will occur at 2 sites. There is potential for up to sixty six workers to be exposed to the notified chemical, each being potentially exposed for 8 hours per day, 30 days per year. The process will initially involve the pumping of the polymer dispersion and addition of other ingredients into a industrial mixer. The final concentration of polymer in the paint formulation will be between 8-16%. The next stage of manufacture will involve high speed dispersion of the ingredients and blending within the mixer. The paint formulation will then be adjusted and tested by up to nine workers for 8 hours a day, 30 days per year, the exposure to the polymer dispersion a result of the testing of the paint formulation through spray painting in a ventilated spray paint booth. Finally the paint will be filtered and filled into 500 mL, 1L, 4L and 20L metal cans. There will be exhaust ventilation in place over the mixers and filling facilities to capture vapour emissions from volatiles used in the paint manufacturing process.

The final paint products will be utilised by an indeterminate number of both professional painters and domestic users. There is potentially major exposure to the notified polymer in the paint formulations through the application of the paint by spraying, brush or rollers.

7. PUBLIC EXPOSURE

Public exposure to the notified chemical during the manufacturing and distribution process is unlikely.

The notified substance will be blended into paints to a final concentration of 8-16% and distributed to customers in standard 0.5-20 L containers. An indeterminate number of professional and home-users will apply the paint containing the notified polymer by means of spray, brush or roller. Public exposure to the notified substance via the use of architectural paints will be considerable; however, application of the paint cures the polymer into a cross-linked polymer paint film, which will be effectively inert.

8. ENVIRONMENTAL EXPOSURE

. Release

The polymer latex is manufactured in a closed system. Ten tonnes of waste polymer latex is estimated to be generated per annum from the filtration and filling operation and through minor spillages during its manufacture. It will be diluted with water before being released to sewer. At Rohm and Haas the waste is treated to generate clean water and solid waste.

It is estimated that approx 15 tonnes per annum of waste will be generated by cleaning up minor spills, cleaning out of manufacturing equipment and rinsing out polymer emulsion drums during paint manufacture. This aqueous waste will be disposed of through a licensed waste disposal contractor. Following treatment the solids from the polymer latex and paint will be buried in approved landfill.

The polymer is also released to the environment through washings of paint application equipment and disposal of empty cans. It is estimated that approximately 2000 kg of polymer waste will be disposed of by trades-persons and domestically per annum. Polymer from washings will be released directly to sewer but residues from empty cans will be contained in landfill.

In the case of spillage, the polymer latex will be contained on site by bunding or absorbed using inert material such as sand and placed in containers for disposal.

. Fate

The precise fate of the polymer in the environment is not known. The polymer is insoluble and would therefore be expected to partition to the sludge component in sewage treatment plants. Of that contained in landfill the high molecular weight of the chemical would reduce its capacity for biodegradation. The polymer is claimed to be stable under environmental conditions and to be bound to the substrate when applied in paint products. As the paint will be used for architectural purpose the polymer is not likely to be released to water after application and will remain fixed to be substrate until the paint is removed. The polymer will cross-link on drying making it insoluble and unlikely to degrade or migrate.

9. ASSESSMENT OF ENVIRONMENTAL EFFECTS

Ecotoxicological data were not provided, which is acceptable for polymers of low concern according to the *Industrial Chemicals (Notification and Assessment) Act, 1989* (the Act).

Bioaccumulation of the polymer is not expected due to its large molecular mass (1,2).

10. ASSESSMENT OF ENVIRONMENTAL HAZARD

The environmental hazard posed by the polymer appears to be small when formulated into paint products. A total of 25 tonnes of the polymer is estimated to be released during manufacture and formulation into paints. In each case the polymer will be treated before release. Waste water will be released to sewer and solid waste containing the polymer will be buried in landfill. Similarly the polymer released directly to sewer through equipment washings by end users would be expected to partition to the solid sludge at not be retained in surface waters. The release by end users would be expected to be diffuse. The low solubility of the polymer and its high molecular weight make it unlikely to pose a hazard to aquatic life.

11. ASSESSMENT OF OCCUPATIONAL AND PUBLIC HEALTH AND SAFETY EFFECTS

Polymer Latex 4783/47 has been notified as a synthetic polymer of low concern under section 23 for the purposes of section 24A of the Act. The polymer meets the criteria for a synthetic polymer of low concern specified in regulation 4A of the Act and therefore is considered of low hazard to human health.

Exposure to the notified chemical will be restricted when utilised in laboratory tests. Dermal exposure may occur through splashing or spillage of the polymer in dispersion, which can be minimised by the use of protective gloves, clothing and goggles.

There is a minimal likelihood of exposure to the notified chemical occurring during manufacture due to the reaction vessel being enclosed. The subsequent procedures, including the manufacture of paint products, provide the risk of dermal exposure to the notified polymer at 34% w/w in water or at 8-16% in paint, by splashing or spillage. Long term dermal exposure could result from paint stuck to skin. This exposure can be minimised by the use of protective gloves, clothing and goggles. Quality control testing by spray painting will provide the opportunity for both dermal and inhalational exposure to the notified chemical, so the use of a respiratory device would be justified to prevent the inhalation of aerosols. There will be local exhaust ventilation in place to remove any volatiles from the other constituents or aerosols, however the notified polymer has low vapour pressure and hence unlikely to pose any inhalational hazard.

The use of the paint formulations by industrial painters and home handy-persons will provide the opportunity for dermal and inhalational exposure when applied by spray-gun, brush and roller. While the use of personal protective clothing, gloves goggles, and if necessary, a respirator, is recommended it cannot be controlled. However, there should be negligible adsorption of the notified polymer by exposed humans due to the high molecular weight of the polymer. The properties of the chemical suggest that there is little risk of acute or chronic toxic effects and therefore low risk to public safety. After coating and curing, the cross-linked polymer forms an inert film and would be unlikely to present any hazard to members of the public.

12. RECOMMENDATIONS

To minimise occupational exposure to Polymer Latex 4783/47 the following guidelines and precautions should be observed:

- local exhaust ventilation should be implemented where there is the likelihood of aerosol generation.

- if engineering controls and work practices are insufficient to reduce exposure to Polymer Latex 4783/47 to a safe level, then:

  - if aerosols are likely to be generated, the appropriate respiratory device should be selected and used in accordance with Australian Standard/ New Zealand Standard (AS/ NZS) 1715 (3) and should comply with AS/NZS 1716 (4)

  - eye protection should be selected and fitted in accordance with AS 1336 (5) and meet the requirements of AS/NZS 1337 (6)

  - industrial clothing should conform to the specifications detailed in AS 2919 (7)

  - industrial gloves should conform to the standards detailed in AS 2161 (8)

- particular care should be taken to avoid spillage of the notified chemical; should spillage occur then an inert absorbent material should be applied before collection and disposal in accordance with Local or State government regulations; recommended personal protective equipment should be as above; use bunding to prevent release into waterways.

- good personal hygiene should be practised to minimise the potential for ingestion.

- a copy of the Material Safety Data Sheet (MSDS) should be easily accessible to employees

13. MATERIAL SAFETY DATA SHEET

The attached MSDS for Polymer Latex 4783/47 was provided in an acceptable format according to the *National Code of Practice for the Preparation of Material Safety Data Sheets* (9).

This MSDS was provided by Dulux Australia as part of their notification statement. It is reproduced here as a matter of public record. The accuracy of this information remains the responsibility of Dulux Australia.

14. REQUIREMENTS FOR SECONDARY NOTIFICATION

Under the *Industrial Chemicals (Notification and Assessment) Act 1989*, secondary notification of Polymer Latex 4783/47 shall be required if any of the circumstances stipulated under subsection 64(2) of the Act arise. No other specific conditions are prescribed.

15. REFERENCES

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2. Gobas FAPC, Opperhuizen A and Hutzinger O, 1986, "Bioconcentration of hydrophobic chemicals in fish: relationship with membrane permeation". *Environmental toxicology and Chemistry* **5**: 637-646.

3. 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.

4. Standards Australia, 1991, *Australian Standard 1716-1991 Respiratory Protective Devices,* Standards Association of Australia Publ., Sydney, Australia.

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

6. 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.

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

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

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