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July 2000

NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME

FULL PUBLIC REPORT

Acrylic Latex 99 R 9502

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Director
Chemicals Notification and Assessment

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Acrylic Latex 99 R 9502

1. APPLICANT

The Valspar (Australia) Corporation Pty Ltd of 203 Power St Glendenning NSW 2761 has submitted a Polymer of Low Concern notification statement in support of their application for an assessment certificate for Acrylic Latex 99 R 9502.

2. IDENTITY OF THE CHEMICAL

The chemical name, CAS number, molecular and structural formulae and details of the polymer composition have been exempted from publication in the Full Public Report.

Marketing Name:	99 R 9502
Other Names:	Acrylic Latex

Characterisation as a Synthetic Polymer of Low Concern

Number-Average Molecular Weight (NAMW):	22960
Weight-Average Molecular Weight:	24883
Polydispersity:	1.08
Maximum Percentage of Low Molecular Weight Species	
Molecular Weight < 500:	0.0 %
Molecular Weight < 1 000:	0.0 %
Polymer Stability	expected to be stable under normal environmental conditions
Reactivity	no reactive functional groups are present
Charge Density	not charged; no dissociable functional groups present

The polymer meets the criteria for assessment as a synthetic polymer of low concern under Regulation 4A of the *Industrial Chemicals (Notification and Assessment) Act 1989*.

Method of Detection and Determination:	infrared spectroscopy
Spectral Data:	2966, 2885, 1735, 1452, 1390, 1243, 1173, 1071, 1027, 1005, 850, 759 cm^{-1}

3. PHYSICAL AND CHEMICAL PROPERTIES

The notified polymer is produced as an aqueous emulsion. As the notified polymer is never isolated, limited data on the physical and chemical properties are available.

Appearance at 20°C and 101.3 kPa:	milky liquid
Glass Transition Temperature:	85.2°C
Specific Gravity:	1.08 - 1.09
Water Solubility:	0.08 % soluble species at 21 - 23°C
Particle Size:	not applicable as the notified polymer is produced and used in emulsion form; emulsion particle size 384 nm
Partition Co-efficient (n-octanol/water):	not determined, see comments below
Dissociation Constant:	no dissociable functional groups are present
Flammability Limits:	not flammable
Autoignition Temperature:	~ 400°C
Explosive Properties:	not explosive
Reactivity/Stability:	resistant to hydrolysis and thermal degradation

3.1. Comments on Physico-Chemical Properties

The polymer is not expected to have a clearly defined melting point, but a glass transition temperature has been provided by the notifier.

The water solubility was determined by smearing a sample of the polymer emulsion onto a weighed glass plate and drying it overnight. After determining the combined weight of plate

and polymer, the plate was immersed in water for 24 h, removed, dried and reweighed. The notified polymer had a water extractable fraction of 0.08 % under these conditions. This test was also performed on the final product containing a mixture of polymers (which will be sold industrial customers). This polymer mixture had a water extractable fraction of 0.24 %. The water solubility of the polymer cannot be directly determined from these results, but it is expected to be low.

The partition co-efficient was not measured, as the notified polymer has low water solubility.

The polymer is expected to be stable under normal environmental conditions. Whilst it does contain ester linkages, hydrolysis in the environmental pH range of 4 - 9 is not expected due to the low water solubility.

4. PURITY OF THE CHEMICAL

Degree of Purity: not stated, produced as a < 50 % aqueous emulsion

Hazardous Impurities: none

Non-hazardous Impurities (> 1% by weight): none

Maximum Content of Residual Monomers: residual monomer identities and concentrations have been exempted from publication; concentrations of residual monomers are all below the relevant cutoffs for the notified polymer to be classified as hazardous

Additives/Adjuvants:

Chemical name:	water	
CAS No.:	7732-18-5	
Weight percentage:	30 - 60	
Chemical name:	2-dimethylaminoethanol	
CAS No.:	108-01-0	
Weight percentage:	< 1	
Toxic properties:	R36/37/38	Irritating to eyes, respiratory system and skin (NOHSC, 1999a)

5. USE, VOLUME AND FORMULATION

The notified polymer will be used as a component of water based industrial surface coatings, for applications including the production of coated hard boards. It will be manufactured in Australia at up to two sites. The polymer will be manufactured as an aqueous emulsion

containing approximately 50 % (w/w) notified polymer. It will then be reformulated at one site to produce the final paint products. The paint will contain less than 10 % (w/w) notified polymer. The paint products will be transferred to 200 L drums, 1000 L intermediate bulk containers (IBCs) or possibly bulk tankers for sale to industrial users.

The notifier estimates the manufacture volumes to be 25 tonnes in the first year, 50 – 75 tonnes in the second year, and 100 tonnes per annum thereafter.

6. OCCUPATIONAL EXPOSURE

Transport and Storage
The polymer emulsion may be manufactured at a separate site to paint production. Transport will be by road, but the types of containers to be used have not yet been determined. Bulk transport is one option, and this may involve exposure of transport drivers and storage workers to drips and spills of the emulsion containing the notified polymer during connection and disconnection of transfer hoses. If the emulsion is transported in drums or IBCs, no exposure of transport and storage workers is expected except in the case of an accident involving damage to the containers.

Warehouse workers and transport drivers will handle the drums and IBCs of finished paint, but no exposure is expected unless the packaging is ruptured.

Polymer Manufacture
At the notifier's facility, the polymer manufacture will involve 4 reactor operators along with 2 quality control personnel, 3 supervisors (who are likely to have limited exposure) and 4 storage workers and forklift drivers. The notifier indicates that 6 to 10 batches will be manufactured per year.

The reactants will be added to an enclosed reactor, either by closed pipe from storage tanks, or by pumping from drums. The resultant polymer solution will be transferred to a thinning tank, then to a holding tank. Sampling for quality control will be carried out through a sampling valve using a tin with an extended handle. There is potential for dermal exposure to the polymer solution in the form of drips and spills during transfer, but normal practice will be transfer through a hard piped system. Exposure to the 50 % emulsion of the notified polymer may occur during sampling and quality control activities. These will involve the operators and quality control personnel. Store workers may have dermal exposure to the solution of notified polymer if small quantities have to be transferred from drums by pump.

No details have been given by the notifier concerning the occupational exposure at the second potential site of manufacture, although conditions are expected to be similar to those described above.

Paint Manufacture
The paint production will involve 6 operators along with 7 personnel in the drumming off section, 2 quality control personnel, 3 supervisors, 5 storage workers and forklift drivers, and 2 truck drivers. The notifier indicates that paint production will occur approximately 70 times per year, in batches of either 20 or 50 tonnes. Only 2 operators and 2 drumming off personnel will be involved with each batch.

The solution of the notified polymer will be transferred from the holding tanks to a make-up tank, along with pigments and additives. The notifier states that the paint production is likely to occur in a dedicated tank, where the paint will be held until it is transferred to the containers for delivery to customers. Sampling for quality control will be performed using a manhole in the make-up tank.

The formulated product (less than 10 % notified polymer) is filled from the makeup tank via an open filter into 200 L drums or 1000 L IBCs. Skin contact with the paint may occur during filling, particularly if spillage occurs. The notifier states that the workers involved in drumming off will wear impervious gloves, overalls and safety boots. Facial protection will also be available.

Paint Application
The paints containing the notified polymer will only be available to industrial customers. The notifier has indicated that one application will be in the continuous production of coated hard boards. The curtain coater will be enclosed, with paint not used being recycled. Exposure to the paint containing the notified polymer will only occur during addition of paint to the recycling reservoir.

After application of the paint, it will cure and crosslink, and the notified polymer will no longer be separately available for exposure.

7. PUBLIC EXPOSURE

Paint products containing the notified polymer will only be used by industry. The potential for public exposure to the notified polymer during manufacture, reformulation, transport and coating operations or from disposal is assessed as negligible. Although members of the public will make dermal contact with articles coated with products containing the notified polymer, exposure will be negligible because of the high molecular weight and the cured state of the notified polymer in the coatings.

8. ENVIRONMENTAL EXPOSURE

8.1. Release

After the polymer resin manufacture, the notifier states that all tanks and lines will be cleaned with the co-solvent and these residues added to the thinning tank. This process will minimise the amount of waste resin released. Solvent used for a final wash will be stored in a drum and added to the next batch of resin. A small amount (2 kg per annum) of polymer will be lost as dry film adhering to the sides of the drum when it is disposed of to landfill.

The polymer residues produced during the paint manufacture will also be minimised by recovering and recycling most of the washings. However, there may be some release of the diluted paint to the sewer in the event that production is not in dedicated equipment. This is estimated by the notifier to be up to 70 kg polymer per annum. Spills may also contribute to the annual release.

The IBC tanks used to transport the final paint product to the customer factories will have the liners removed and slit, to allow the paint to dry on the inside of the liner, which is then disposed of to landfill.

The notifier is not yet able to specify the number and sites of the end users of the paint containing the notified polymer. However, they have provided information on the likely use pattern and estimates on the predicted residues that will be released to the environment. Those provided below are based on maximum expected manufacture volumes.

Summary Of Releases To The Environment (Landfill)

Resin Production-losses as dry film on drums	2 kg per annum
Paint Production-dry film on IBC liners	80 kg per annum

Summary Of Releases To The Environment (Sewers)

Resin Production-losses from spills/cleaning	13 kg per annum
Paint Production-cleaning of tanks and lines	70 kg per annum
Paint Production-spills, drips etc	40 kg per annum
Customer Use- cleaning of equipment	2.6 kg per annum
Customer Use-spills, drips etc	35 kg per annum

8.2. Fate

Waste polymer sent to landfill as a dry solid bound in the paint matrix is expected to remain associated with the soils and sediments and would not be expected to leach into the aquatic environment.

When released to the sewer the polymer is expected to remain in the aqueous phase as an emulsion.

The coating is expected to dry to form a solid inert film that after use will share the fate of the substrate and not present a significant hazard. Any fragments, chips or flakes of the paint will be of little environmental concern as they are expected to be inert.

Bioaccumulation of the polymer is unlikely due to the high molecular weight of the polymer, even before curing (Connell, 1990).

9. EVALUATION OF TOXICOLOGICAL DATA

No toxicology data were submitted. Polymers of low reactivity and high molecular weight do not readily cross skin or other biological membranes, and the toxicity of the notified polymer is therefore expected to be low.

10. ASSESSMENT OF ENVIRONMENTAL EFFECTS

No ecotoxicological data were submitted. The polymer contains no functional groups known

to be reactive in the environment and therefore should not present a hazard to the aquatic environment (Hamilton, 1997).

11. ASSESSMENT OF ENVIRONMENTAL HAZARD

The notifier estimates that during paint manufacture and application approximately 82 kg/annum of notified polymer will be disposed of to landfill as solid waste and 160.6 kg/annum will be released to the sewer as aqueous waste. All solid residues will remain associated with the soil and sediment due to the high molecular weight and the stability of the cured paint matrix. The fate of the aqueous residues released to the sewer system is less predictable as the notified polymer may remain in the aqueous phase as an emulsion at low concentrations.

The Sewage Treatment Plant servicing the manufacturing site has a daily capacity of 28 ML. A dilution of 1:3 upon entering receiving waters can be assumed for this plant and a worst case Predicted Environmental Concentration (PEC) for the paint manufacturing process is calculated as follows:

123 kg/annum (~2.46 kg per batch @ 50 batches/annum)
28 ML discharge daily from sewage treatment plant
Concentration of notified polymer in discharge = 87 ppb
Further diluted 1:3 by receiving waters to 29 ppb

The PEC is several orders of magnitude less than concentrations expected to cause adverse effects in aquatic organisms, so the aquatic hazard is predicted to be low.

The majority of the notified polymer will be applied to various substrates (hard board and others not specified) and cured into a solid paint coating. The polymer will share the fate of the substrates and the eventual disposal of the article to landfill is unlikely to present a hazard to the environment, as it will be in a solid matrix not expected to biodegrade or leach. If the products coated with the notified polymer are incinerated, the environmental hazard is also expected to be low. The aqueous waste released to the sewer by end users will be widespread and at low levels that should not be an environmental hazard.

The main environmental hazard would occur through spillage in transport accidents. Small quantities of the polymer may be released to drains and waterways. It is difficult to predict the behaviour of the polymer in the natural aquatic environment.

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

Hazard Assessment
No toxicological information has been provided for the notified polymer and therefore the substance cannot be assessed against the NOHSC *Approved Criteria for Classifying*

Hazardous Substances (NOHSC, 1999b). The polymer is not expected to be hazardous by dermal exposure as the high molecular weight will preclude absorption through the skin.

The polymer emulsion containing < 50 % notified polymer, as manufactured, is not a hazardous substance. The Material Safety Data Sheet (MSDS) for the polymer solution lists a number of potential health effects, namely skin, eye and respiratory irritation, dermatitis, nausea and liver, kidney and blood disorders. These are likely to relate mainly to the solvent, 2-dimethylaminoethanol, and any residual monomers, rather than the notified polymer. Due to the high molecular weight and low reactivity of the polymer, the toxicological hazard of the notified polymer is expected to be low, although it may be a slight skin and eye irritant based on the properties of the individual components (National Institute of Occupational Safety and Health, 1999).

Occupational Health and Safety

There is little potential for significant occupational exposure to the notified polymer in the transport and storage of the polymer solution or the paint component containing this polymer, except in transfer to bulk transport containers. There may be exposure during the manufacture and reformulation of the polymer and during production of paint, and in the use and disposal of the paints.

During the transfer, manufacture, reformulation and application processes, the main exposure route for the notified polymer will be dermal. The paints and polymer solutions will be viscous, and ready formation of aerosols is not expected. Splashes are also not likely during filling operations. All processes involving the notified polymer are likely to be enclosed and automated except for transfer to bulk containers for transport of the polymer emulsion, filling the paint containers for transport to the customers and transfer from these containers to the recycling tank of the coating equipment. It is possible that paints including the notified polymer will also be used by other customers for other applications, and greater worker exposure may occur.

Due to the low toxicological hazard posed by the notified polymer, protective measures used to prevent exposure to the solvents in the emulsion and paint should provide sufficient protection against the notified polymer.

Once the applied final paint mix, containing a maximum of 10 % notified polymer, has hardened, the polymer will not be separately available for exposure or absorption.

There is no NOHSC exposure standard for 2-dimethylaminoethanol, identified as an ingredient in the polymer emulsion. The manufacturer has recommended an exposure limit of 5 ppm TWA for this chemical.

Public Health

Paint products containing the notified polymer will only be used by industry. Although members of the public will make dermal contact with articles coated with products containing the notified polymer, exposure will be negligible because of the high molecular weight and the cured state of the notified polymer in the coatings.

The notified polymer is not expected to pose a significant hazard to public health when used in the proposed manner.

13. RECOMMENDATIONS

To minimise occupational exposure to Acrylic Latex 99 R 9502 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 workplace;

- 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, 1994);

- 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 resin solution containing the notified polymer was provided in accordance with the *National Code of Practice for the Preparation of Material Safety Data Sheets* (NOHSC, 1994).

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 subsection 64(1) of the Act, secondary notification may be required if the polymer characteristics cease to satisfy the criteria under which it has been accepted as a Synthetic Polymer of Low Concern. Secondary notification of the notified polymer may be required if any of the circumstances stipulated under subsection 64(2) of the Act arise. No other specific conditions are prescribed.

16. REFERENCES

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