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NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME

FULL PUBLIC REPORT

EXPERIMENTAL RESIN QR-1188

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Director
Chemicals Notification and Assessment

FULL PUBLIC REPORT

EXPERIMENTAL RESIN QR-1188

1. APPLICANT

Rohm and Haas Australia Pty Ltd, Hays Road, Point Henry, Geelong, Victoria 3221.

2. IDENTITY OF THE CHEMICAL

Other names: Experimental Resin QR-1188 (applicable to the aqueous polymer solution)

Maximum percentage of low molecular(<1000) species: <1%

Maximum content of residual monomers: <0.1% w/w
(methyl methacrylate and QM-516)

Based on the nature of the chemical and the data provided, the notified chemical is considered to be non-hazardous. Therefore, the chemical name, CAS No:, molecular formula, structural formula, molecular weight and identity of the monomer, have been exempted from publication in the Full Public Report and the Summary Report.

3. METHOD OF DETECTION AND DETERMINATION

Structure elucidation: Infra red spectroscopy

Spectral data: (medium AgCl)

Major absorption wavenumbers for identification: (cm^{-1})
1730; 1240; 1060; 1150.

4. PHYSICAL AND CHEMICAL PROPERTIES

The notified polymer will be imported as an aqueous solution. As indicated in brackets, the data presented in this section refer to either the notified polymer alone or the solution.

Appearance:	clear greenish-yellow liquid
Odour:	slight ammoniacal odour
Melting point:	0°C (solution - as for water)
Boiling point:	100°C (solution - as for water)
Density:	1059 kg/m^3 (solution)
Specific gravity:	1.0-1.2 (solution)
Vapour pressure:	not provided as the notified polymer is a high molecular weight polymer. The volatile component in the solution is water.
Water solubility:	the notified polymer is miscible with water
Partition coefficient:	not provided as the notified polymer is a surface active agent
Hydrolysis:	the notified polymer was not hydrolysable at pH 4.4 and 8.9 @ 24°C over seven days
Adsorption/Desorption:	not provided as the concentration of the notified polymer in solution could not be measured; it is likely to adsorb strongly to soil and cannot be easily desorbed
Dissociation constant (pK_a):	7

Flash point:	not applicable as the polymer has negligible vapour pressure
Flammability limits:	the notified polymer is non-flammable
Autoignition temperature:	the notified polymer is not autoignitable
Explosive potential:	the notified polymer is not explosive
Reactivity:	the polymer in the solution is stable under ambient conditions. Hazardous polymerisation will not occur. Heating will cause polymer decomposition in a temperature-time dependent manner. Onset of polymer decomposition is 117°C. Principal thermal decomposition products of the solution include ammonia, acetic acid, water, polymethacrylic acid, methane, and nitrous oxide. There are no known incompatible substances. The solution may coagulate if frozen.

Comments on physico-chemical properties

The notified polymer being a 25% solution of the polymer in water, has a boiling point, melting point and vapour pressure that are equivalent to water. Hydrolysis has been tested at two pH values, and has been found to be negligible. The notified polymer has a tertiary nitrogen and the dissociation constant pk_a is likely to be similar to that for triethylamine.

The high water solubility appears to be derived from the polarity of the functional groups; acrylate polymers are usually very water insoluble. However, the notifier notes that the mode of action of the polymer is thought to impart water insolubility under use conditions.

5. PURITY OF THE CHEMICAL

Degree of purity: approximately >95.1% w/w

Toxic or hazardous impurities:

Chemical name:	t-butyl alcohol
Synonyms:	1,1-dimethylethanol; trimethylmethanol; trimethyl carbinol; 2-methyl-2-propanol
CAS No:	75-65-0
Maximum residual:	0.5% w/w
Toxic properties:	tumorigen; mutagen; reproductive effector (1)

Chemical name:	acetic acid
Synonyms:	ethanoic acid; methanecarboxylic acid; glacial acetic acid
CAS No:	64-19-7
Maximum residual:	1.85% w/w
Toxic properties:	mutagen; reproductive effector; eye and skin irritant (1)

Chemical name:	hexamethylenetetramine
Synonyms:	1,3,5,7-tetraazatricyclo [3.3.1.1^{3,7}]-decane; hexamethylenetetramine; HMT; HMTA; hexamine; 1,3,5,7-tetraazaadamantane; hexamethylenamine
CAS No:	100-97-0
Maximum residual:	3% w/w (maximum)
Toxic properties:	tumorigen; mutagen(1)

Chemical name:	methyl methacrylate
Synonyms:	methyl 2-methyl-2-propenoate;
CAS No:	80-62-6
Maximum residual:	0.0050% w/w
Toxic properties:	tumorigen; mutagen; reproductive effector; skin and eye irritant (1)

Chemical name: residual QM-516 monomer
CAS No: confidential
Maximum residual: 0.0039% w/w
Toxic properties: unknown

Chemical name: formaldehyde
Synonym: formalin
CAS No: 50-00-0
Maximum residual: <0.0002% w/w
Toxic properties: tumorigen; mutagen; reproductive effector; skin and eye irritant (1)

Non-hazardous impurities: none

Additives/Adjuvants:

Chemical name: water
CAS No: 7732-18-5
Weight percentage: 75% w/w

Chemical name: ammonia (to adjust pH)
CAS No: 7664-41-7
Weight percentage: 0.2% w/w (max)

6. INDUSTRIAL USE

The notified polymer will be imported as a 25% w/w aqueous polymer solution, Experimental Resin QR-1188. This polymer solution will be used exclusively as a thickening agent in the production of an acrylic polymer latex. The acrylic polymer latex will contain approximately 2% w/w of Experimental Resin QR-1188. This latex will be used in the manufacture of industrial paints. The industrial paint will contain approximately 0.9% w/w of Experimental Resin QR-1188.

7. PUBLIC EXPOSURE

Under normal conditions of use, public exposure to the notified polymer is unlikely to occur. The polymer will be imported in secure containers and will be available for industrial use only. The polymer will be stabilised within the final paint coating. Wastes will be coagulated to form a solid coagulum which will be transported to a secure landfill.

8. OCCUPATIONAL EXPOSURE

Experimental Resin QR-1188 will be imported in 200 litre sealed steel drums. Therefore, significant risk of exposure to the notified polymer during transport and storage is not likely.

Reformulation

After importation, the polymer solution will be reformulated into an acrylic latex at Rohm and Haas latex manufacturing facility. In any one year, reformulation will take place during 50 eight-hour shifts. Each shift will involve a maximum of eight workers.

Reformulation involves blending the polymer solution with the acrylic latex to form a latex product containing 2% w/w of the polymer solution. The polymer solution will be pumped from drums to a mix tank containing the latex. The pumping operation will take place in an open drum annex, external to the process building where the mixing operation will occur. Local exhaust ventilation will be used at drum openings during the charging operation from the drum annex. The production vessel used for the mixing operation will be operated in a closed condition. Local exhaust ventilation will be used at the site of the vessel should it be opened for any reason. A scrubber unit will receive any fumes extracted from the closed vessel.

After the latex has been reformulated, it will be pumped from the drain tank through a filtration system to 200 kg closed head drums. Local exhaust ventilation will be utilised in this operation. The filter cake in the used filter bags from the filter system will be manually transferred to 200 kg drums which will in turn be transferred to an approved site under the Environment Protection Authority (EPA) licence where the wastes will be charged to a coagulation pit.

Quality assurance and research and development will be performed on the reformulated latex product.

Maintenance will be performed by maintenance engineers.

Exposure per worker per shift to the notified polymer can be from 0.3 to 3.5 hours. With the implementation of engineering controls and personal protection measures as detailed by the notifier, worker exposure to the notified polymer is anticipated to be negligible especially after reformulation as it will be

present as a minor component of <1% w/w. Therefore, exposure of those workers who handle the disposal and treatment of the filter cake and other wastes will also be negligible.

Paint manufacture

The latex product containing <1% w/w of the notified polymer will be used to manufacture industrial paints which will contain approximately 0.9% w/w of the aqueous polymer solution containing the notified polymer. It is expected that 12 customers and 20 production facilities will be involved.

In a typical paint-producing plant, one batch per week of the industrial paint will be produced and up to eight operators will be involved at various stages of the process. The plant will operate one eight-hour shift per 24 hours for a maximum of 250 days per year.

In the manufacture of the paint, solid powders will be combined with liquid raw materials at ambient temperatures in a two stage process to produce a liquid coating. The latex containing the notified polymer will be introduced during the second stage of the process, via metered pumps either from closed feed lines from a fixed bulk tank or from portable mini-bulk tanks. An effective extraction system for removing airborne particles will be used. Quality assurance will be performed on the finished paint before it is filled into 200 litre open head steel drums via an automatic filling line. Once filled, the steel drums will be sealed, palleted and warehoused before shipment. In the laboratory, an extraction system will be implemented. Research and development will also be carried out.

Exposure per worker per shift to the notified polymer can be from one hour in production and filling to a maximum of eight hours in quality assurance and research and development. The paint will contain approximately 0.2% w/w of the notified polymer and with the implementation of engineering control and personal protection measures as detailed by the notifier, exposure to the notified polymer will thus be negligible.

Paint use

The paint will be used in an industrial setting. The paint will be applied outdoors through spray nozzles very close to the application surface.

Exposure of workers to the notified polymer will be negligible as it will be present as a minor component (approximately 0.2% w/w) in the paint.

9. ENVIRONMENTAL ASSESSMENT

. Release

Environmental release of the notified polymer is not expected to occur during transport and storage except in the event of an accident.

Significant environmental release can occur at three stages:

i) Reformulation into the acrylic latex

Major release will occur from the washdown of the 200 kg steel drums after the notified polymer which they contain have been emptied into the mix tanks for reformulation into the acrylic latex. Releases via this route are expected to reach 2% (maximum of 2 tonnes per annum).

ii) Paint manufacture

Release of the notified polymer as waste paint will amount to an additional 1.7% (maximum of 1.7 tonnes per annum).

iii) Paint application

Further environmental release of small quantities of the notified polymer is anticipated during machine application of the quick drying latex paint which is done outdoors as a coarse spray directed at close range to the application surface. Overspray is said to be minimal and there will be no rapid running of paint after application. The extent of such releases to the environment, though small, cannot be quantified but should mainly be confined to the application surfaces.

. **Fate**

Waste from the latex and paint manufacture processes containing the notified polymer will be treated stepwise with ferric chloride and lime to coagulate the solids and form salts. The extent of removal of solids by this process is not known, but from evidence provided, it is expected to be an efficient process. Solid waste is disposed of to a landfill, and liquid waste to chemical sewer.

Waste disposed of at landfill will contain unknown quantities of the coagulated polymer. The notifier states that the polymer will not leach from the coagulum because it will be ionically bound to a matrix of insoluble polymer and ferric oxide in the coagulum.

Also taking into account the comments made under physico-chemical properties, evidence suggests that the notified polymer is likely to remain soil-bound. Even though biodegradability data are not available (and are not required for polymers of number average molecular weight >1000), microbial activity is unlikely to degrade the notified polymer to any significant extent.

Unknown quantities of the notified polymer (though likely to be low) contained in the waste not captured by the treatment process will, due to its high solubility, enter the aquatic phase in sewerage treatment plants. Whether it will remain in this compartment or adsorb to soil is unclear (see comments on physico-chemical properties).

Sewerage from the notifier's factory goes to coagulation pits and after treatment the clean supernatant water is spray-irrigated to a plant afforestation scheme. Sewerage from the paint manufacturers' production facilities is likely to enter various treatment plants and be released to a variety of receiving waters.

Additional minute quantities of the notified polymer are likely to be released from dried paint. Painted surfaces are likely to weather slowly, and the paint may be chipped off and dispersed. However, the notified polymer is not expected to leach or be separated from the paint chips.

10. EVALUATION OF TOXICOLOGICAL DATA

Toxicological data as listed in Part C of the Schedule are not required for the assessment of this polymer. Therefore, such data were not submitted for assessment.

11. ASSESSMENT OF ENVIRONMENTAL EFFECTS

Ecotoxicological data as listed in Part C of Schedule are not required for polymers of number average molecular weight >1000.

Aquatic toxicity of the notified polymer is likely to relate to the amount present in the ionised form. Quaternary ammonium polymers are known to exert moderate aquatic toxicity. However, it is stated in the literature that toxicity is greatly reduced in the environment because of preferential binding to dissolved organics in water (2).

12. ASSESSMENT OF ENVIRONMENTAL HAZARD

Environmental exposure will be largely confined to the coagulated material discarded at landfill, with unknown, smaller quantities entering sewerage treatment plants.

Environmental exposure caused by the material disposed of at landfill is unlikely to pose a hazard since the notified polymer is likely to remain in the coagulum. Its likely strong adsorption to soil also suggests that any leached polymer is likely to become soil-bound.

The notified polymer due to its limited environmental release, is unlikely to pose a significant environmental hazard.

13. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY EFFECTS

High molecular weight polymers such as the notified polymer are expected to exhibit low toxicological concerns as they are unlikely to cross biological membranes to produce systemic effects. So far there have been no reports of work-related injuries or diseases and there is no information on any health condition which can be aggravated by exposure to this chemical.

Monomer vapours can be evolved during processing but are not expected to produce any adverse effects due to the small amount (<0.1 %) present as residual monomers. Similarly, the low levels of low molecular weight polymers and other impurities present are not expected to produce any toxic effects. However, as acetic acid is present at 1% (3) , and hexamethylenetetramine at >1% (4), personal protection is recommended during the handling of the notified chemical before reformulation.

When handling spills, care should be taken to avoid falls as the floor may be slippery. Otherwise, the notified polymer is not expected to present any safety hazard to workers.

Therefore, under normal use conditions the notified chemical is unlikely to pose any significant acute health or safety effects on workers and the public.

14. RECOMMENDATIONS FOR THE CONTROL OF OCCUPATIONAL EXPOSURE

To minimise worker exposure to the notified polymer, the following guidelines and precautions should be observed:

- the workplace should be well ventilated and engineering controls such as local exhaust ventilation should be used;
- when handling the notified chemical before reformulation into the acrylic latex, personal protective equipment which comply with Australian Standards (AS) should be worn such as:
  - splash proof goggles (AS 1336 and AS 1337) (5, 6);
  - impervious gloves (AS 2161) (7);
  - protective clothing (AS 3765.1) (8); and
  - respirator (AS 1715 and AS 1716) (9, 10) when ventilation is insufficient;
- good work practices should be implemented to avoid splashings or spillages;
- storage should be in robust sealable containers and in well ventilated places;

- good housekeeping and maintenance should be practised. Spillages should be promptly cleaned up using absorbents and disposed in accordance with local or State regulations;

- good personal hygiene should be observed; and

- a copy of the Material Safety Data Sheet for the notified chemical should be easily accessible to employees.

15. MATERIAL SAFETY DATA SHEET (MSDS)

The MSDS for the notified polymer (Attachment 1) was provided in Worksafe Australia format (11). This MSDS was provided by Rohm and Haas Australia Pty Ltd 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 Rohm and Haas Australia Pty Ltd.

16. REQUIREMENTS FOR SECONDARY NOTIFICATION

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

17. REFERENCES

1. Registry of Toxic Effects of Chemical Substances (RTECS) database, 1991.

2. Goodrich, M S, et al, *Environmental Toxicology and Chemistry*, vol. 5, 1991, pp 509-515.

3. National Occupational Health and Safety Commission, *Concolidated List of Hazardous Substances*, (in print).

4. National Occupational Health and Safety Commission, *Guidance Note for Determining and Classifying a Hazardous Substance*, AGPS, Sydney, 1991.

5. Australian Standard 1336-1982, "Recommended Practices for Eye Protection in the Industrial Environment", Standards Association of Australia Publ., Sydney, 1982.

6. Australian Standard 1337-1984, "Eye Protectors for Industrial Applications", Standards Association of Australia Publ., Sydney, 1984.

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

8. Australian Standard 3765.1-1990, "Clothing for Protection Against Hazardous Chemicals, Part1: Protection against general or specific chemicals", Standards Association of Australia Publ., Sydney, 1990.

9. Australian Standard 1715-1991, "Selection, Use and Maintenance of Respiratory Protective Devices", Standards Association of Australia Publ., Sydney, 1991.

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

11. National Occupational Health and Safety Commission, *Guidance Note for the Completion of a Material Safety Data Sheet*, 2nd. edition, AGPS, Canberra, 1990.