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NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME

FULL PUBLIC REPORT

Acrylic Polymer in HF-05

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Director
Chemicals Notification and Assessment

FULL PUBLIC REPORT

Acrylic Polymer in HF-05

1. APPLICANT

Rohm and Haas Australia Pty Ltd of 969 Burke Road CAMBERWELL Victoria 3124 have submitted a limited notification with their application for an assessment certificate for the Acrylic Polymer in HF-05. The notified polymer will be used as a fibre-fill to be applied to fibreglass insulating batts.

2. IDENTITY OF THE CHEMICAL

Based on the nature of the chemical and the data provided the Acrylic Polymer in HF-05 is considered to be non-hazardous. Therefore, the chemical name, other names, CAS number, molecular and structural formulae, molecular weight, composition of the chemical and formulation containing the polymer, methods of detection and determination, spectral data and precise details of import volume have been exempted from publication in the Full Public Report and the Summary Report have been exempted from publication in the Full Public Report and the Summary Report.

Trade Name:	Resin HF-05, Experimental resin HF-05

3. PHYSICAL AND CHEMICAL PROPERTIES

As the notified polymer is imported for use as an aqueous resin, some physical and chemical properties have been determined solely for the resin HF-05 and not for the polymer. This is indicated below.

Appearance at 20°C and 101.3 kPa:	clear, white liquid (resin)
Odour:	acrylic (resin)
Melting Point:	not determined
Glass-transition Temperature:	198.9°C
Specific Gravity:	1.0-1.2
Vapour Pressure:	not determined
Water Solubility:	soluble, no limits for dilution of resin
Partition Co-efficient (n-octanol/water) log P_{ow}:	not determined, polyanionic

Hydrolysis as a Function of pH:	not expected to hydrolyse on the basis of chemical structure
Dissociation Constant pKa**:**	≅ 4.87 (propanoic acid)
Flash Point:	not determined
Flammability Limits:	not readily flammable
Combustion Products:	oxides of carbon and hydrogen; incomplete combustion may yield acrylic monomers
Pyrolysis Products:	not determined
Decomposition Temperature:	> 177^{o}C
Decomposition Products:	thermal decomposition may yield acrylic monomers
Autoignition Temperature:	not determined
Explosive Properties:	not explosive
Reactivity/Stability:	non-reactive
Particle Size Distribution:	not applicable (liquid)

Comments on physico-chemical properties
Vapour pressure is not applicable as the polymer is a high molecular weight solid dissolved in water.

The polymer is polyanionic and infinitely soluble and would be expected to undergo ion exchange with surrounding water.

The notifier states that the acrylic polymer will not hydrolyse. The polymer contains no groups normally expected to hydrolyse under normal environmental conditions, pH 4-9.

The partition coefficient was not calculated but may be expected to be low due to the low water solubility. The adsorption/desorption data were not provided by the notifier, it may also be expected to be low due to the high water solubility.

The notifier states that the pKa of the polarised acrylate unit would be expected to be similar to that of propanoic acid ie 4.87.

4. PURITY OF THE CHEMICAL

Additives/Adjuvants:	water 47-48% (formulation)

5. INDUSTRIAL USE

The notified acrylic polymer will be imported from the USA as a component of a polymer resin, Resin HF-05. Resin HF-05 will be used as a fibre-fill binder to be applied to fibreglass insulating material. The insulating material will be used in both domestic and industrial situations. It will be imported in quantities > 1 tonne for the first five years.

The resin will be sold directly to customers for application to the insulating material. The substance will be delivered in bulk to five sites in Sydney and Melbourne. Prior to application the resin Resin HF-05 will be diluted down to give a concentration of the notified acrylic polymer of 4-6%. This will be applied to the fibreglass bats where it will cure/ crosslink under the action of oxygen. Once cured the crosslinked mat will be packaged and sold for domestic and commercial insulation. The distribution of the final product would be expected to be widespread.

6. OCCUPATIONAL EXPOSURE

The notified polymer will be imported in drums and > 1 tonne will be imported per year for the first 5 years.

The polymer resin will be supplied direct to Rohm and Haas's customers without repackaging. Occupational exposure during transportation and warehousing will be minimal and will only occur due to accidental spillage.

The polymer resin Resin HF-05, will be diluted prior to use at the customers' facilities. At each site dilution, application and packaging of the treated product, fibreglass batts, will require approximately 6 employees to be exposed to the notified polymer. These staff will consist of 3 in the mixing/spraying operation, 2 packaging workers, 1 Q.C testing. These employees will potentially be exposed to the notified polymer at concentrations ranging from > 50% in the Resin HF-05 to < 10% in the treated batts. The blender/mixers will potentially be exposed to the highest concentration of the notified polymer, > 50% for 6-8 hours/day for 100 days/year.

7. PUBLIC EXPOSURE

The notified polymer will be imported into Australia as part of the polymer resin, Resin HF-05. The polymer resin will be sold to manufacturers who will dilute the material so that the concentration of the notified polymer is < 10%. The diluted polymer resin will be applied to fibreglass insulating material which will be used in homes, factories and other buildings which require insulation. Following application of the resin, for the purpose of fibre binding, the notifier claims that in the presence of oxygen, it will fully cure/crosslink and will not leach out. Public contact with the resin will be minimal and only occur on occasions when the insulation material containing the notified polymer is installed or in accidental circumstances. In such instances the polymer, which has a number-average molecular weight (NAMW) of > 1000, should pose a negligible hazard to the public.

Minor public exposure may result from disposal of unused resin, or accidental spillage of the resin during transport and storage, and during dilution and application. However, adequate measures are described by the notifier to minimise the risk of public exposure during disposal, or in the event of accidental spillage.

8. ENVIRONMENTAL EXPOSURE

. Release

The product will be stored and transported by road in sealed containers and will be supplied directly to processors. Losses to the environment are not expected during storage or transportation of the resin or finished product.

The notifier has estimated up to 10% of Resin HF-05 containing the notified substance will be lost to the environment at processing facilities. These losses would be expected to include drum/storage container residues, transfer piping and blending tank residues, samples, filter residues and spray application. The concentrated liquid or solid residues will be either incinerated or contained in landfill. A small proportion of that released may go to sewer, this would most likely occur through washings of the mixing tank or accidental release as a result of spillages. As the processing takes place in a closed system a very small proportion of residue will be lost to the environment through washings (personal communication).

The notifier claims release of the polymer to environment after application would be minimal, because the polymer will be cured and becomes bound to the substrate making it unlikely to migrate. Any polymer released from the end product would be widespread across Australia due to the range of applications for domestic and commercial insulation.

Should a spillage occur the chemical will be contained with inert material such as sand. Liquids and solid materials are to be put into separate containers for recovery or disposal. Spilled material will be disposed of by degradation via incineration.

. Fate

The precise fate of the chemical in the environment is not known. A small proportion of the total polymer released is expected to be released to sewer, where it would remain in solution due its high water solubility. Ionic exchange may occur between the cations of the polymer and the surrounding water.

Synthetic polymers of polyacrylic acid are resistant to biodegradation (4). Under both aerobic and anaerobic conditions polycarboxylates would be expected to only undergo slight biodegradation (5). Poor biodegradation of these compounds has been observed in waste water treatment. The removal of synthetic polymer from the waste water is most likely through precipitation or adsorption rather than biodegradation (4).

The polymer will thermally decompose at temperatures greater than 177ºC. Combustion products are expected to be oxides of carbon and hydrogen. If combustion is incomplete acrylic monomers may be produced.

The component of free polymer contained in landfill would be unlikely to biodegrade to a significant degree. The polymer would not be expected to sorb to soil particles, but rather would be mobile depending on the water content of the soil, and whether it is in the ionised or neutral forms.

Although the polymer is soluble its high molecular weight reduces the possibility of biodegradation. Similarly, bioaccumulation of the polymer is unlikely due to the high molecular weight > 1000.

9. EVALUATION OF TOXICOLOGICAL DATA

The Act does not require the provision of toxicological data for polymers of NAMW greater than 1,000. No data are available for the notified chemical. Toxicity data for a compositionally similar material are given in the Material Safety Data Sheet (MSDS) for the polymer resin, Resin HF-05 (references unsighted). These data are as follows:

Oral LD50 - rat:	> 5 000 mg/kg
Dermal LD50 - rabbit:	> 5 000 mg/kg
Eye irritation - rabbit:	slight irritant
Skin irritation - rabbit	practically non-irritating

The compositionally similar material has a low oral and dermal toxicity and has a low potential for skin and eye irritation to the species tested.

10. ASSESSMENT OF ENVIRONMENTAL EFFECTS

Ecotoxicological data were not provided, which is acceptable for polymers with a NAMW exceeding 1 000, according to the Act. Due its high NAMW the polymer is not expected to cross biological membranes.

The type of polymers, to which the notified chemical belongs, are moderately toxic to green algae, inhibiting growth through overchelation of nutrients (6). One of the polymer's monomers has the ability to chelate nutrient elements and may exhibit toxic effects at concentrations greater than 1 ppm (6). Another of the polymer's monomers has a low acute toxicity for fish (*Pimephales promelas* 96h-LC_{50} of 11 800 mg/L) and aquatic invertebrates (*Daphnia magna* 24h-EC_{50} of 1 390 mg/L) and appears to be more toxic to algae (*Scenedesmus subspicatus* 96h-EC_{50} of 169 mg/L), this is still in the practically non-toxic range. However, other sources have stated that the same monomer may be expected to exhibit toxic effects to algae at concentrations of 1.8 ppm (8).

11. ASSESSMENT OF ENVIRONMENTAL HAZARD

The risk posed by the use of the end product appears to be minimal as it is incorporated into insulation material at a small percentage and binds to the fibre of the insulation curing and crosslinking. The use of the product would be expected to be widespread.

The processing of Resin HF-05 in Sydney and Melbourne appears to pose minimal risk to the environment. Most of the polymer residues will be concentrated and either degraded by incineration or contained in landfill.

Taking the worst case assumption that all of the chemical released during processing remains in solution and thus is discharged into receiving waters, a predicted environmental concentration (PEC) for the substance in Melbourne sewage water can be estimated from the following assumptions:
Two of the processing sites release trade waste to the same sewer (Werribee). Each of the processing sites utilises 20% of the total imported on a continuous basis throughout the year. This would release 40% of the total waste to effluent. The daily waste water discharge to Werribee in Melbourne is 470 ML. This provides a PEC of < 20 ppb for Melbourne.

The aquatic hazard appears to be minimal as the predicted environmental concentration of the Resin is low and the polymer is not considered toxic. Although one of the polymer's monomers is toxic to algae in concentrations of 1 ppm even in the worst case assumption the concentration of the polymer will be well below toxic levels. Similar potential for toxicity comes from ionic exchange of another of the polymer's monomers.

12. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY EFFECTS

The notified polymer has a NAMW > 1 000 and should not, therefore, be able to cross biological membranes and cause adverse health effects. The levels of residual monomers and low molecular weight species also are unlikely to render the polymer hazardous (3). A compositionally similar material has a low oral and dermal toxicity and has a low potential for skin and eye irritation. The identity of this material is not stated and the toxicity tests were unsighted.

It can be concluded that there is a low risk of adverse health effects to workers during transport, storage or application of the notified acrylic polymer as the resin, Resin HF-05. There will be even less risk from coming into contact with the crosslinked/cured polymer after application to insulation batts.

On the basis of available information the Acrylic Polymer in Resin HF-05 would not be classified as hazardous according to the criteria of Worksafe Australia (3).

The notified polymer will be incorporated into resin which will be applied to fibreglass insulation material during the manufacturing process, and will not be available to the general public. Minimal public contact may result following installation of the

insulation material containing the notified polymer; however, the polymer, which has a NAMW of > 1 000 will be immobilised in the hardened resin and as such would pose a negligible health hazard. The potential for minor public exposure during transport and disposal of the polymer is minimised by the recommended practices during dilution and application, storage and transportation.

13. RECOMMENDATIONS

To minimise occupational exposure to the Acrylic Polymer in Resin HF-05 the following guidelines and precautions should be observed during the reformulation and application stages using the polymer resin Resin HF-05:

- Safe practices, as should be followed when handling any chemical formulation, should be adhered to - these include:

    - minimising spills and splashes;
    - practising good personal hygiene; and
    - practising good housekeeping and maintenance including bunding of large spills which should be cleaned up promptly with absorbents and put into containers for disposal.

    It is expected that, in the industrial environment, protective clothing conforming to and used in accordance with Australian Standard (AS) 2919 (9) and protective footwear conforming to Australian/New Zealand Standard (AS/NZS) 2210 (10) should be worn as a matter of course. In addition it is advisable when handling chemical formulations containing the notified polymer to wear chemical-type goggles (selected and fitted according to AS1336 (11) and meeting the requirements of AS/NZS 1337 (12)), impermeable gloves (AS 2161) (13) should be worn to protect against unforseen circumstances.

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

14. MATERIAL SAFETY DATA SHEET

The attached MSDS for the notified chemical was provided in a format similar to the Worksafe Australia format (14).

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

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. Sax and Lewis, 1989, *Dangerous Properties of Hazardous Materials*, Van Nostrand Reinhold, New York

2. National Occupational Health and Safety Commission, 1994*. List of designated hazardous substances* [NOHSC:10005(1994)], AGPS, Canberra, 1994

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

4. UK Department of the Environment (1991*) Pollutants in Cleaning Agents Final Report*. Consultants in Environmental Sciences Limited, pp 40-46

5. Opgenorth H, 1992. Polymeric materials Polycarboxylates In: NT de Oude Ed. *The Handbook of Environmental Chemistry Volume 3* Part F Anthropogenic Compounds Detergents. Springer-Verlag, Berlin, pp 337- 350

6. Nabholz JV, Miller P and Zeeman M, 1993. Environmental Risk Assessment of New Chemicals Under the Toxic Substances Control Act (TSCA) Section 5. *In Environment Toxicology and Risk Assessment*, Landis, Hughes & Lewis Eds, ASTM Philadelphia 40-55

7. Verschueren K, 1983. *Handbook of Environmental Data on Organic Chemicals*. Van Nostrand Reinhold Company, New York, pp 1150-1151

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

9. Standards Australia, Standards New Zealand, 1994, *Australian/ New Zealand Standard 2210 - 1994 Occupational Protective Footwear, Part 1: Guide to Selection, Care and Use. Part 2: Specifications,* Standards Association of Australia Publ., Sydney, Australia, Standards Association of New Zealand Publ. Wellington, New Zealand.

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

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

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

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