File No: NA/206

Date: November 21, 1994

NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME

FULL PUBLIC REPORT

POLYMER IN MAINCOTE HYDUR 30

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Director
Chemicals Notification and Assessment

FULL PUBLIC REPORT

POLYMER IN MAINCOTE HYDUR 30

1. APPLICANT

Rohm and Haas Australia Pty Ltd, 969 Burke Road, Camberwell, Victoria 3124, Australia.

2. IDENTITY OF THE CHEMICAL

Based on the nature of the chemical and the data provided, the polymer in Maincote Hydur 30, is considered to be non-hazardous. Therefore, the chemical identity and composition, purity, specific use, import volume, site identity, degradation products and loss of monomers have been exempted from publication in the Full Public Report and the Summary Report.

Other name: Acrylic copolymer

Trade name: Specific trade name is not available. It is the main component of the imported aqueous polymer emulsion, Maincote Hydur 30.

Maximum percentage of low molecular weight species (molecular weight < 1000): 8.4%

Method of detection and determination:

Infra red spectroscopy and gel permeation chromatography

3. PHYSICAL AND CHEMICAL PROPERTIES

Except for appearance and odour, the physico-chemical properties described below refer to the notified chemical.

Appearance at 20°C and 101.3 kPa:	Not described for the notified chemical but the imported polymer emulsion is a milky white liquid.
Odour:	Ammonia odour
Melting/Boiling Point:	Not determined. The material softens and flows over a wide temperature range. The polymer solution is expected to boil initially at the boiling point of water (100°C) with the vapour pressure that of water (2 kPa @ 20°C).
Glass transition temperature:	38°C
Density:	1107.8 kg/m^3
Vapour Pressure:	By analogy with similar high molecular weight polymers, this polymer is not expected to be volatile under conditions of use.
Water Solubility:	Low water solubility expected at 20°C but not determined.

Fat Solubility:	Not provided
Partition Co-efficient (n-octanol/water) log $P_{O/W}$:	Not provided as the notified chemical has low water solubility. This property would be difficult to measure on a high molecular weight polymer of wide polydispersity.
Hydrolysis as a function of pH:	Not hydrolysable. The polymer has no sterically accessible hydrolysable functionalities. Low water solubility would preclude hydrolysis of the ester functionalities at environmental pH.
Adsorption/Desorption:	Not provided. However, as the solvent evaporates from the polymer solution it will become more viscous and sticky and will readily bind to the soil, thereby becoming immobilised.
Dissociation Constant:	Not expected to dissociate.
Flash Point:	Not provided as the notified chemical is a non flammable high molecular weight polymer.
Flammability Limits:	Non flammable
Combustion Products:	Oxides of carbon and hydrogen; incomplete combustion may produce acrylic monomers.
Pyrolysis Products:	Not provided
Decomposition Temperature:	> 177°C
Decomposition Products:	Acrylic monomers
Autoignition Temperature:	Not provided as the notified chemical is a non flammable high molecular weight polymer.
Explosive Properties:	Capable of dust explosion when in dry form.
Reactivity/Stability:	Stable at room temperature and pressure; hazardous polymerisation will not occur.
Particle size:	**A**verage - 182 nm.

Comments on Physico-Chemical Properties:

There is no, or very limited, data available on the physical and chemical properties of the polymer itself, due to the polymer not being isolated from the *in situ* manufactured polymer dispersion. The above data is in most cases for the 50% polymer emulsion in water.

The polymer contains a small amount of a free carboxylic acid, and therefore is expected to have typical acidity.

4. PURITY OF THE CHEMICAL

Degree of purity: 99.16%

5. INDUSTRIAL USE

The notified chemical will be used as a component of a surface coating. It will be imported into Australia as the main component (approximately 50%w/w) of an aqueous polymer emulsion, Maincote Hydur 30.

The notified chemical was first developed in 1993 and has been used in Australia as a Commercial Evaluation Category chemical since November 1993.

6. OCCUPATIONAL EXPOSURE

The major route of exposure to the notified chemical will be through skin contact .

The notified chemical will be imported and transported in sealed 200 kg steel drums. At Rohm and Haas, no repackaging of the notified chemical will be carried out. Therefore, there will be no significant risk of worker exposure to the notified chemical except in the event of an accident.

At the coatings formulators' sites, the notified chemical will be processed, quality tested and filled into drums or cans for sale to industrial applicators. There is a potential for worker exposure for those personnel involved with processing and drum filling. Exposure of quality control and general maintenance personnel is not expected to be high due to smaller amounts of the notified chemical encountered in these tasks. As the processed product will be transported to customer sites in sealed containers, transport workers are unlikely to be exposed to the notified chemical except in the event of an accident.

Drum reconditioners responsible for the removal of residues from the drums will also be exposed to the notified chemical but exposure is not expected to be high due to the small amount of the notified chemical remaining in these residues.

Surface coatings will contain approximately 25% of the notified chemical. Applicators and supervisory personnel will be exposed to the notified chemical although exposure is expected to be minimal. Following application, the notified chemical will slowly cure or crosslink. Once cured it will be bound to the substrate and there will be no exposure of workers to the notified chemical through contact with the surfaces.

7. PUBLIC EXPOSURE

The paint products will be used for industrial applications only and will not be available for use by the general public. Once applied the notified polymer will slowly cure/crosslink, and once cured, the polymer becomes bound and is not bioavailable. For these reasons, exposure to the public is not expected to be significant.

8. ENVIRONMENTAL EXPOSURE

. Release

The product will be imported in 200 kg drums and distributed to customer facilities.

Maincote Hydur 30 will be supplied to customers in the form in which it is imported and no repackaging will take place. At these sites where reformulation occurs (and which are not controlled

by the notifier), blending will take place in closed blending pots. Local exhaust ventilation is generally provided for the following operations at these sites:
i) Sampling,
ii) Blending pot filling, and
iii) Container filling - at the fill point.
Residue from the filter will either be disposed of separately, or together with the filter, to landfill.

No losses to the environment are expected during storage at Rohm and Haas facilities as the product is in sealed containers. The notifier claims that "in the event of a spill, the acrylic copolymer is expected to be easily contained on site". Transport after reformulation is expected to be in the 20 L or 4 L containers. Storage at the customer facilities of both the polymer emulsion and finished surface coating is expected to be in sealed areas with adequate spill containment and in accordance with state legislation (see below).

As the sites of reformulation are not controlled by the notifier, they are unable to identify any specific mechanism of release. However, the notifier estimates that the production losses for similar types of coatings are up to 10 %, or approximately 2500 kg acrylic copolymer based on 50 tonne of emulsion imported. It is expected that these losses would include drum/storage container residues (the empty drums containing Maincote Hydur 30 residues may be sent to a recycler), transfer piping and blending tank residues, samples and filter residues. The acrylic copolymer vapour pressure is very low and therefore losses by volatilisation are expected to be negligible.

There will be some loss of polymer during application which is stated to be < 1%. The notifier claims that the major releases from application "shall occur as the result of cleaning application equipment and the disposal of containers which may contain small residual quantities of the coating". Washings from the equipment are likely to be washed down the drain with copious quantities of water, while the coating containers are expected to be disposed of to landfill. The notifier estimates that this will amount to less than 100 kg/y, based on 50 tonne of emulsion imported. Losses during application seem low in comparison with similar submissions.

For the estimated 2600 kg total loss of the acrylic copolymer (2500 kg in reformulation and 100 kg in application), the notifier states that "Disposal will be in accordance with relevant local, state and federal legislation". Further, the notifier concludes that the "Concentrated liquid and solid residues are expected to be disposed of by incineration and/or to landfill (possibly in a pretreated form)". The Material Safety Data Sheet suggests that the emulsion should first be coagulated with stepwise addition of ferric chloride and lime. The clear supernatant that is left is then flushed to a chemical sewer. The contaminated liquid and solids are disposed of by incineration in accordance with local, state and federal regulations.

. Fate

As the notified substance is an acrylic copolymer with low water solubility, degradation in or leaching from landfill sites is not expected. Incineration of the notified substance is expected to produce water and oxides of carbon and nitrogen.

Most of the notified acrylic copolymer is not expected to be released to the environment until it has been fully cured into a solid polymer matrix on the surface of the treated item. Bioaccumulation is unlikely due to the high molecular weight (> 1000) of the polymer.

9. EVALUATION OF TOXICOLOGICAL DATA

Toxicity data is not required for polymers with a Number Average Molecular Weight (NAMW) of > 1000 according to the *Act*. The following data was provided and has been assessed.

The following toxicity studies were not performed on the notified chemical but were performed on a structurally similar chemical known as Experimental Emulsion E-2950 PMN which contains 46.0 % acrylic copolymer.

9.1 Acute Toxicity

Table 1Summary of the acute toxicity of a polymer chemically similar to that in Maincote Hydur 30

Test	Species	Outcome	Reference
Oral	rats	LD_{50}: >5000 mg/kg	1
Dermal	rats	LD_{50}: >2000 mg/kg	3
Skin irritation	rabbits	non-irritant	5
Eye irritation	rabbits	non-irritant	8

9.1.1 Oral Toxicity (1)

This study was carried out according to the *OECD Guidelines for Testing of Chemicals* No: 401 (2).

A single dose of 5000 mg/kg of Experimental Emulsion E-2950 PMN was administered by gavage to 12 (six males and six females) Crl:CD(R)BR rats. The animals were observed for 14 days. No deaths were noted during the study. Treatment related clinical signs were not observed during the study. Gain in bodyweight was unaffected. Necropsy revealed no gross changes.

The results of this study indicate an oral LD_{50} of >5000 mg/kg Experimental Emulsion E-2950 PMN 30 in male and female rats.

9.1.2 Dermal Toxicity (3)

This study was carried out according to the *OECD Guidelines for Testing of Chemicals* No:402 (4).

A single dose of 2000 mg/kg of Experimental Emulsion E-2950 PMN was applied by occlusive application to the shaved intact skin of 12 (six males and six females) Crl:CD ®BR rats for 24 hours. The animals were observed for 14 days. No deaths were noted during the study. Throughout the study, red-stained fur around the eyes and/or muzzle was observed in many animals of both sexes. From the later half of the study onwards, alopecia was also observed in many animals of both sexes. A single case of scant faeces and several cases of desiccation were observed in females only. Gain in bodyweight was unaffected. Necropsy revealed no gross changes.

The results of this study indicate a dermal LD_{50} of >2000 mg/kg for Experimental Emulsion E-2950 PMN in male and female rats.

9.1.3 Skin Irritation (5)

This study was carried out according to the *OECD Guidelines for Testing of Chemicals* No: 404 (6).

A single dose of 0.5 ml of Experimental Emulsion E-2950 PMN was administered by occlusive application to the shaved intact skin of six adult male New Zealand White rabbits for four hours. The application site was examined 1, 24, 48 and 72 hours and at 7 days after patch removal. Skin reactions were assessed according to Draize (7). There were no signs of any skin reaction to the material tested.

The results of this study indicate that Experimental Emulsion E-2950 PMN is not a skin irritant.

9.1.4 Eye Irritation (8)

This study was carried out according to the *OECD Guidelines for Testing of Chemicals* No:405 (9).

A single dose of 0.1 ml of Experimental Emulsion E-2950 PMN was instilled into the conjunctival sac of one eye of each of nine New Zealand White adult male rabbits. The untreated eye of each rabbit served as the control. Three of the treated eyes were washed with tap water 30 seconds post-exposure whilst the remaining six treated eyes were left unwashed. Both eyes of each rabbit were treated with fluorescein dye and were examined for staining at 1, 24, 48 and 72 hours and at 7 days post-exposure. Effects were assessed according to Draize (10,11). No effects were observed in any of the eyes.

The results of this study indicate that Experimental Emulsion E-2950 PMN is not an eye irritant in rabbits.

9.2 Overall Assessment of Toxicological Data

The acrylic copolymer in Experimental Emulsion E-2950 PMN has very low acute oral toxicity (oral LD_{50} in rats : >5000 mg/kg) and low acute dermal toxicity (dermal LD_{50} in rats: >2000 mg/kg). It is not an eye or skin irritant in the rabbit. The main polymer in Maincote Hydur 30 is expected to have similar properties due to its similar chemical structure.

10. ASSESSMENT OF ENVIRONMENTAL EFFECTS

No ecotoxicological data were provided, which is acceptable for polymers of NAMW >1000 according to the *Act*.

Due to its high NAMW the polymer is not expected to cross biological membranes.

11. ASSESSMENT OF ENVIRONMENTAL HAZARD

The acrylic copolymer is unlikely to present a hazard to the environment when it is formulated into surface coatings and applied to substrates.

The polymer is also unlikely to present a hazard to aquatic organisms due to the end-use application, and the polymer's high molecular weight and expected low solubility in water.

The main environmental exposure arises from disposal of approximately 2500 kg per annum of the acrylic copolymer in reformulation. However, since it is stable and immobile in soil, and expected to have low water solubility, together with its high molecular weight, environmental hazard is expected to be low.

12. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY EFFECTS

So far, there has been no reported adverse health effects in workers exposed to this chemical. The notified chemical being a high molecular weight polymer has very low vapour pressure so, the major route of exposure will be through skin contact. Respiratory exposure may occur during application of the surface coating. However, due to its high molecular weight, it is unlikely to cross biological membranes to bring about systemic effects. The impurities in the form of monomers are of too low a concentration individually to bring about any significant toxic effects (12). Animal studies with Experimental Emulsion E-2950 PMN, a chemical similar to the commercial product Maincote Hydur 30 suggest that the notified polymer has very low acute oral toxicity, low acute dermal toxicity and is not an eye or skin irritant.

The notified chemical itself is non flammable but, at temperatures >177°C it decomposes forming acrylic monomers which are likely to be flammable and explosive when exposed to heat or flame. In the presence of heat, moisture or oxidisers, these monomers may also undergo spontaneous explosive polymerisation. The emulsion may splatter at temperatures >100°C. However, under normal working

conditions (normal temperature and pressure, and when engineering controls are implemented), the notified chemical is not anticipated to pose any such risk to the safety of workers.

While public exposure to materials coated with Maincote Hydur 30 may be extensive, public exposure to the notified polymer is expected to be negligible. The products prepared with the notified polymer are for use only by industrial applicators. After the high molecular weight polymer is applied it slowly cures under the action of oxygen or sunlight. Once cured, the polymer is bound and is not bioavailable.

In the case of accidental spillage during transport, the public may be exposed to the notified polymer in Maincote Hydur 30. This is minimised by the recommended practices for storage and transportation. Emergency procedures for the containment and cleanup of accidental spills are available and should be followed.

Therefore, under normal conditions, the notified chemical is not expected to pose any significant acute health or safety risk to workers or the general public.

13. RECOMMENDATIONS

To minimise occupational exposure to the notified chemical the following guidelines and precautions should be observed:

If engineering controls and work practices are insufficient to reduce exposure to a safe level the following personal protection equipment which comply with Australian Standards (AS) should be worn are:

- splash-proof safety glasses (AS 1337) - *Eye Protectors for Industrial Applications* (13);
- impervious gloves (AS 2161) - *Industrial Safety Gloves and Mittens (excluding Electrical and Medical Gloves)* (14);
- protective overalls; and

- good work practices should be implemented to avoid spillages or splashings
- in the event of a spill, for the liquid form, soak up spill with an inert absorbent and contain for disposal according to State regulations;
- the work place should be well ventilated;
- a copy of the Material Safety Data Sheet (MSDS) should be easily accessible to all employees.

14. MATERIAL SAFETY DATA SHEET

The MSDS for Maincote Hydur 30 was provided in Worksafe Australia format (15).

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.

15. REQUIREMENTS FOR SECONDARY NOTIFICATION

Under the *Industrial Chemicals (Notification and Assessment) Act 1989* (the Act), secondary notification of the polymer in Maincote Hydur 30 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. Rohm and Haas Company, USA, “Acute Oral Toxicity Study in Male and Female Rats”. Data on file, Report No: 91R-113, 1991.

2. *OECD Guidelines for Testing of Chemicals*, "Acute Oral Toxicity" No: 401, 1981.

3. Rohm and Haas Company, USA, “Acute Dermal Toxicity in Rats”. Data on file, Report No: 91R-114, 1991.

4. *OECD Guidelines for Testing of Chemicals*, "Acute Dermal Toxicity" No: 402, 1987.

5. Rohm and Haas Company, USA, “Skin Irritation Study in Rabbits”. Data on file, Report No: 91R-115, 1991.

6. *OECD Guidelines for Testing of Chemicals*, "Acute Dermal Irritation/Corrosion" No: 404, 1981.

7. Draize, J.H., et. al., *The Appraisal of the Safety of Chemicals in Foods, Drugs, and Cosmetics,* Association of Food and Drug Officials of the United States, Topeka, Kansas, 1965.

8. Rohm and Haas Company, USA, “Eye Irritation Study in Rabbits”. Data on file, Report No: 91R-116, 1991.

9. *OECD Guidelines for Testing of Chemicals*, "Acute Eye Irritation/Corrosion" No: 405, 1987.

10. Draize, J.H., et.al., J Pharmacol. Exp. Ther., vol. 82, 1944, pp. 377-390.

11. Draize, J.H., et. al., *The Appraisal of Chemicals in Foods, Drugs, and Cosmetics,* Association of Food and Drug Officials of the United States, Austin, Texas, 1959.

12. National Occupational Health and Safety Commission, *List of Hazardous Substances*, AGPS, Canberra, 1994.

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

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

15. National Occupational Health and Safety Commission, *National Code of Practice for the Preparation of Material Safety Data Sheets*, AGPS, 1994.