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**NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION  
AND ASSESSMENT SCHEME**

**FULL PUBLIC REPORT**

**Modified Acrylic Polymer in Acrocryl 63138**

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Director  
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**FULL PUBLIC REPORT****Modified Acrylic Polymer in Acrocryl 63138****1. APPLICANT**

AC Hatrick Chemicals Pty Ltd of 49-61 Stephen Road, Botany NSW 2019 has submitted a limited notification with their application for an assessment certificate for Modified Acrylic Polymer in Acrocryl 63138. The notified chemical will be used as an ingredient in the application of paper coatings.

**2. IDENTITY OF THE CHEMICAL**

Modified Acrylic Polymer in Acrocryl 63138 is not considered to be hazardous based on the nature of the chemical and the data provided. Therefore the chemical name, CAS number, molecular and structural formulae have been exempted from publication in the Full Public Report and the Summary Report.

Other name: Modified Acrylic Polymer

Trade name: Acrocryl 63138

**3. PHYSICAL AND CHEMICAL PROPERTIES**

The physico-properties listed are for the polymer and not the formulation unless indicated otherwise.

<b>Appearance at 20°C and 101.3 kPa:</b>	white milky liquid emulsion (in water) (formulation)
<b>Odour:</b>	sweet odour (formulation)
<b>Boiling Point:</b>	100°C (for formulation)
<b>Specific Gravity:</b>	1060-1080 kg/m <sup>3</sup>
<b>Vapour Pressure:</b>	not determined for polymer
<b>Water Solubility:</b>	not available, however due to the high molecular weight, water solubility is believed to be insignificant.

<b>Partition Co-efficient (n-octanol/water) log P<sub>ow</sub>:</b>	not available due to low water solubility.
<b>Hydrolysis as a function of pH:</b> the polymer would hydrolyse.	as water solubility is low it is unlikely
<b>Adsorption/Desorption:</b>	the polymer, being non volatile and when dry being a solid, would have low mobility and limited effects to soil.
<b>Dissociation Constant</b> pK <sub>a</sub> :	not applicable
<b>Flash Point:</b>	not applicable
<b>Flammability Limits:</b>	not applicable
<b>Combustion Products:</b>	carbon monoxide, carbon dioxide
<b>Decomposition Temperature:</b>	not provided
<b>Decomposition Products:</b>	not provided
<b>Autoignition Temperature:</b>	not provided
<b>Explosive Properties:</b>	not applicable
<b>Reactivity/Stability:</b>	it is believed to be stable due the high molecular weight.
<b>Particle size distribution: -</b>	none specified for polymer

### **Comments of physico-chemical properties**

No hydrolysis data was available for the notified polymer. The notifier has indicated a very low solubility in water for the polymer. Water is used as a solvent/storage medium and hydrolytic stability is expected for the polymer. Hydrolysis of the *n*-butyl acrylate ester is unlikely under normal environmental conditions.

Partition coefficient data is not applicable as a polymer of this molecular size (NAMW >1000) and low water solubility is not expected to cross biological membranes. No measurement of adsorption/desorption was made. The notifier has indicated that they expect very low mobility and limited effects on soil. As a suspension in water the polymer would be expected to partition to sludge. Due to the type of use the polymer may be expected to bind to metal ions in soil and be immobile. The notified polymer contains a small amount of free carboxylic acid functionalities, expected to have typical acidity.

#### **4. PURITY OF THE CHEMICAL**

The exact purity of the notified chemical has been granted exemption.

**Degree of purity:** >90% pure

#### **5. INDUSTRIAL USE**

The notified chemical will be in the emulsion formulation Acrocryl 63138 to be mixed with water, mineral fillers, titanium dioxide and dispersing agents for application as a paper coating. It is expected that 1500 tonnes of the notified chemical will be manufactured per year, with the amount rising to 2500 tonnes per year after 5 years.

#### **6. OCCUPATIONAL EXPOSURE**

The entire manufacturing process is computer controlled and takes place within a closed system. The components are added to the manufacturing reactor from underground storage tanks, the amount and rate of addition being totally computer controlled. Further components will be weighed out manually by an operator and dissolved in water, the subsequent solution being added from an addition tank by computer. All other additives are similarly weighed out by an operator and the subsequent solutions added from an addition tank controlled by a computer. At the completion of the reaction the product is automatically pumped into a blender, then a storage tank from where it will then be pumped into drums, palletcons or a bulk carrier for customer delivery.

There are four workers involved in the above process, all being involved in the weighing out, sampling and packaging operations as well as quality control. It is estimated that the levels of exposure for each worker would not exceed 30 minutes for weighing up raw materials and 30 minutes for final adjustments of the product for each 20,000 kg batch. Initially no more than 6-7 batches per month will be processed, therefore maximum exposure should be for 6-7 hours per month. As most of the manufacturing process takes place within a closed system there is little chance of exposure to the notified chemical apart from during final adjustments and quality control sampling. To reduce the potential for exposure all workers will wear appropriate protective clothing as well as eye protection and impermeable gloves.

The transport of the notified chemical to the customer site will involve transport in either sealed road tankers with a capacity of 20 cubic meters, sealed palletcons with polyethylene inner containers of a 1000 litre capacity or sealed drums with a polyethylene liner, capacity 200 litres. There is anticipated to be exposure to the notified chemical only in the event of an accidental spill, in which case containment with sodium chloride to coagulate the formulation for disposal and the use of protective clothing, goggles and rubber gloves should be used.

At the customer site the notified chemical in the paper coating product will be pumped automatically into customer paper mill storage tanks with the same design as that at the manufacturing and storage sites. To use the product the customer will

pump the product from storage into a closed dispersion tank where it will be mixed with other ingredients to form a paper coating preparation. This paper coating preparation will be automatically dispensed onto the paper surface by a trailing blade where it will dry. The notifier has not provided any details of the exact exposure levels to workers at the paper mills, but it is not expected that the levels of exposure would be significant as most of the process is fully automated. Ventilation systems will be operational within the paper mill to reduce potential fumes. However it is expected that workers should be wearing as a minimum, appropriate protective clothing, protective eyewear, impermeable gloves and respiratory devices due to the nature of other chemicals used in the paper manufacturing process.

## **7. PUBLIC EXPOSURE**

Acrocryl 63138 will be manufactured in Australia in a sealed reactor at the Botany Bay site of AC Hatrick Pty Ltd. At completion of the polymerisation process, the product will be pumped into a holding tank where it is tested and adjusted to specification. It will then be transferred to a bulk storage tank prior to being sent to a AC Hatrick site at Wacol, Queensland. The polymer will be transported by road in 200 L steel drums, pallets or bulk carriers. Public exposure during storage and distribution of the notified chemical is not expected to occur.

The paper manufacturer will hold Acrocryl 63138 in storage tanks prior to use. To use the product, the customer will pump out the required amount from the tanks to a closed dispersion tank, where it will be mixed with other ingredients to form a paper coating preparation. The coating will be applied to paper surfaces using a trailing blade within the confines of the paper mill. Although, the application process will be conducted in the open, inhalational exposure to the notified polymer would be unlikely as the polymer is non-volatile. All waste will be recycled at the paper mill and no waste polymer will be produced. No public exposure to the notified polymer is expected to occur during its use by the paper manufacture.

Disposal of any waste notified polymer during its manufacture will be to landfill and no public exposure is expected to occur.

No information was provided on the concentration of Acrocryl 63138 in mineral paper coating, however it will be used to coat fine boards. Given that such boards will be used for non-contact food packaging applications such as cereal boxes, public contact with the mineral coating may be widespread.

## **8. ENVIRONMENTAL EXPOSURE**

### **. Release**

The notified polymer is manufactured in a completely closed reactor vessel controlled by a computer system. At the site of manufacture washing waters are held and reused and no release of the notified material is anticipated. Transfer of the notified material as Acrocryl 63138 is by a mechanical pump and passed through an open sieving process.

The notified polymer is to be used as a component in the manufacture of a mineral coating for paper. The coating material is applied to the paper by a trailing blade within the paper mill. The product is pumped from closed storage tanks directly to a closed dispersion tank where it is mixed with ingredients to form a paper coating preparation. Any discharge will be water vapour and possibly ammonia. Discharges will be confined to the mill and collected via atmosphere scrubber apparatus or filters. All material within the paper mill is recycled and the notifier claims near 100% efficiency in the coating process.

The notifier has indicated that equipment washings at both the manufacture site and paper mill are recycled. Road transport tankers are rinsed with minimal water when unloaded and washings collected into storage tanks for use. It is unclear what quantity of polymer, if any, will enter water systems. Any residual product in washings that enter a sewage treatment facility would be expected to settle to sludge and be disposed of via landfill or incineration.

Any spillage of an aqueous suspension of the notified polymer that may occur is to be contained by either sand, earth or other absorbent. Sodium chloride can be used and may coagulate and facilitate cleaning. Used absorbent is to be sealed and disposed of to landfill at approved sites. Quantities of such material are thought to be limited. After application and drying, the polymer is fixed to the surface of the paper where it remains for the life of the article. Paper products are usually disposed of either to landfill or by recycling.

### **. Fate**

All of the raw notified polymer can be recycled. The highest environmental exposure of the notified polymer is likely to be as landfill either directly from spillage or as the end product on paper disposed to landfill. Disposal to landfill is to be in accordance with local, state and federal regulations. It is expected to have a low mobility in the soil and should have limited effects. The raw polymer may be expected to bind to metal ions in soil and be immobile.

The notifier has provided no data on the likely behaviour of the polymer during paper recycling. During such processes, waste paper is repulped using a variety of alkaline, dispersing and wetting agents, water emulsifiable organic solvents and bleaches. These agents enhance fibre separation, ink detachment from the fibres, pulp brightness and the whiteness of paper. After pulping, the contaminants and ink are separated from the fibres by pumping the stock through various heat washing, screening, cleaning, flotation and dispersion stages. During these processes there is

the potential for hydrolysis of the polymer to occur, however this is unlikely given the structure and chemical composition of the polymer. Should the polymer be removed from the paper by such processes, then it will most likely be incorporated with the sludge remaining from recycling, with sludge being placed in landfill, or incinerated.

No bioaccumulation of the polymer is expected because of its very low  $P_{ow}$  and low water solubility (1), and its very large molecular size which is likely to inhibit membrane permeability and prevent uptake during exposure (2,3).

## **9. EVALUATION OF TOXICOLOGICAL DATA**

Under the requirement for a limited notification, toxicological data is not required. However, the notification indicates that prolonged repeat exposure may cause some transient irritation to sensitive individuals, this possibly being due to the styrene. The high NAMW for the notified polymer (expected to be >500,000) suggests that it is not expected to traverse biological membranes and constitute a toxicological hazard. The notified polymer contains low levels of residual monomers (maximum of 0.1%) and is stated to contain negligible quantities of low molecular weight species.

The notified polymer is not isolated from Acrocryl 63138. The only hazardous constituents identified in Acrocryl 63138 are the residual unreacted monomers and the ammonia added (0.5-0.75%) to adjust pH which is consumed in the reaction. However, no loss by exudation or leaching from the mineral paper coating is expected, and therefore they are not expected to present as toxicological hazards.

As no toxicological information was required or submitted for this notification and the levels of toxic residual monomers is not at a significant level, the notified chemical cannot be classified according to Worksafe Australia's Approved Criteria for Classifying Hazardous Substances (4).

## **10. ASSESSMENT OF ENVIRONMENTAL EFFECTS**

Ecotoxicological data is not required for polymers of NAMW >1000 according to the criteria for a limited notification as they are not transported readily across membranes and therefore can not affect living organisms. Polymers with free carboxylic acid functions are known to be moderately toxic to green algae, especially those with large numbers of free carboxylic acids. Toxicity values range from 1 - 100 ppm, depending on the number of free carboxylic acids. The most potent structure for poly(carboxylic acid) polymers contains paired acids which are equally distant from the polymer backbone and which have one acid on alternating carbons (5). Based on the structure of the notified polymer this is unlikely to occur and it may be presumed to be slightly toxic to green algae.

## **11. ASSESSMENT OF ENVIRONMENTAL HAZARD**

The polymer is unlikely to present a hazard to the environment when manufactured, stored, mixed and applied to paper products as described due to the very low release to the environment as most materials are consumed in the process. Due to the end use application and the high molecular weight of the polymer it is unlikely to be hazardous to aquatic organisms.

The concentration of the polymer on the finished paper is expected to be low. It is also expected to be strongly bound to the paper and other components of the coating mixture. It is unlikely to be released into the environment under normal conditions.

A Material Safety Data Sheet has been provided and contains adequate warnings in regard to protection of the environment, containment and disposal of spillage. The emergency procedure guide for non-dangerous goods and the Material Safety Data Sheets contain adequate instructions for containing and disposing of material spilt as a result of an accident during transport. These include coagulating the spill with sodium chloride following by incineration or burying in landfill.

## **12. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY EFFECTS**

There is little risk of exposure to the notified chemical during the initial manufacturing process as the entire process takes place within a closed reaction system and is computer controlled. There is potential for exposure to some of the initial ingredients and additives, some of which may be harmful or toxic, during the weighing process and final adjustments to the final product, therefore adequate protective clothing, goggles and impermeable gloves are essential. It is also recommended that workers employ respiratory protective devices utilising gas filters as the potential exists for respiratory irritation from the starting monomers. This risk should be further minimised by use of mechanical ventilation.

There also exists the potential for exposure during the connection of pumping equipment to the tankers or drums, however protective clothing should make any risk negligible.

As the subsequent pumping into customer storage tanks and application into the paper coating process involves closed tanks and automated processes, it is unlikely that there is any major risk of exposure to the notified chemical except in the instance of spillage. There does exist the possibility of exposure to fumes released from other chemicals used in the paper coating process which should therefore make the use of respirators amongst employees as well as the appropriate protective clothing and equipment essential. The risk of this will further be reduced by engineering controls such as atmosphere scavenging ventilation in use in the paper mills.



Although public contact with paper products treated with the notified polymer may occur, the high NAMW expected for the polymer suggests that absorption is unlikely, and therefore there is negligible risk to public safety.

The overall risk from the notified chemical is expected to be low providing the appropriate protective devices are utilised where the chemical is not used in closed systems.

### **13. RECOMMENDATIONS**

To minimise occupational exposure to Modified Acrylic Polymer in Acrocryl 63138 the following guidelines and precautions should be observed:

local and general exhaust ventilation should be employed during the manufacture and use of this chemical.

if engineering controls and work practices are insufficient to reduce exposure to Modified Acrylic Polymer in Acrocryl 63138 to a safe level, then:

#### *Manufacture*

the appropriate respiratory device should be selected and used in accordance to Australian Standard/ New Zealand Standard (AS/ NZS) 1715 (6) and should comply to AS/NZS 1716 (7).

chemical goggles should be selected and fitted in accordance to AS 1336 (8) and used in accordance to AS/NZS 1337 (9).

industrial clothing must conform to the specifications detailed in AS 2919 (10) and AS 3765.1 (11).

rubber gloves should conform to the standards detailed in AS 2161 (12) and AS 3765.1 (11).

all occupational footwear should conform to the standards detailed in AS/NZS 2210 (13).

#### *Use*

chemical goggles should be selected and fitted in accordance to AS 1336 (8) and used in accordance to AS/NZS 1337 (9).

industrial clothing must conform to the specifications detailed in AS 2919 (10)

rubber gloves should conform to the standards detailed in AS 2161 (12) and AS 3765.1 (11).

all occupational footwear should conform to the standards detailed in AS/NZS 2210 (13).

## *Spillage*

the appropriate respiratory device should be selected and used in accordance to Australian Standard/ New Zealand Standard (AS/ NZS) 1715 (6) and should comply to AS/NZS 1716 (7).

industrial clothing must conform to the specifications detailed in AS 2919 (10) and AS 3765.1 (11).

rubber gloves should conform to the standards detailed in AS 2161 (12) and AS 3765.1 (11).

particular care should be taken to avoid spillage of the notified chemical.

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

a copy of the Material Safety Data Sheet should be easily accessible to employees.

## **14. MATERIAL SAFETY DATA SHEET**

The Material Safety Data Sheet (MSDS) for Modified Acrylic Polymer in Acrocryl 63138 was provided in an acceptable format (14).

This MSDS was provided by AC Hatrick Chemicals Pty Ltd as part of their notification statement. The accuracy of this information remains the responsibility of AC Hatrick Chemicals Pty Ltd.

## **15. REQUIREMENTS FOR SECONDARY NOTIFICATION**

Under the *Industrial Chemicals (Notification and Assessment) Act 1989*, secondary notification of Modified Acrylic Polymer in Acrocryl 63138 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**

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