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**NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION
AND ASSESSMENT SCHEME**

FULL PUBLIC REPORT

ACUMER 9400 POLYMER

This Assessment has been compiled in accordance with the provisions of *the Industrial Chemicals (Notification and Assessment) Act 1989*, and Regulations. This legislation is an Act of the Commonwealth of Australia. The National Industrial Chemicals Notification and Assessment Scheme (NICNAS) is administered by Worksafe Australia which also conducts the occupational health & safety assessment. The assessment of environmental hazard is conducted by the Department of the Environment, Sport, and Territories and the assessment of public health is conducted by the Department of Human Services and Health.

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Director
Chemicals Notification and Assessment

FULL PUBLIC REPORT
ACUMER 9400 POLYMER

1. APPLICANT

Rohm and Haas Australia Pty Ltd of 969 Burke Rd, Camberwell, Victoria 3124 has submitted a limited notification for assessment of Acumer 9400 polymer.

2. IDENTITY OF THE CHEMICAL

Acumer 9400 polymer 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, chemical composition and exact use have been exempted from publication in the Full Public Report and the Summary Report

Trade name: Acumer 9400 is a 50% (approx.) aqueous emulsion of the notified polymer

Number-average molecular weight: > 1000

Maximum percentage of low molecular weight species (molecular weight < 1000): 4%

Method of detection and determination:

Infrared spectroscopy

3. PHYSICAL AND CHEMICAL PROPERTIES

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

Appearance at 20°C and 101.3 kPa:	clear, yellow liquid (emulsion)
Glass-transition Temperature:	42.8 - 69.2°C (polymer)
Density:	1330 kg/m ³ (emulsion)
Water Solubility:	> 40%
Hydrolysis as a function of pH:	not expected to hydrolyse on the basis of chemical structure
Dissociation Constant pKa:	5.55 (polymer)
Decomposition Temperature:	> 290°C
Reactivity/Stability:	contact with alkali will generate heat

Comments on physico-chemical properties

Vapour pressure is not applicable as the polymer is a high molecular weight solid dissolved in water.

The water solubility of the polymer is not known. However, Acumer 9400 is made to be fully soluble in water. It is manufactured as a >40% solids material, that is completely dissolved in water. The material is therefore described as having a solubility of greater than 40%.

The notified polymer does not contain functional groups which hydrolyse. Neither the backbone chain, nor the pendent carboxylic acid groups will hydrolyse under the conditions of the OECD hydrolysis test (TG 111).

Partition coefficient is not applicable as the polymer is highly soluble in water.

No information is currently available for absorption/desorption. However the polymer is expected to bind to soil as clay is a component in most soils.

4. PURITY OF THE CHEMICAL

Degree of purity: > 98.5%

**Toxic impurities:
(> 0.1% by weight):** None

**Non-toxic impurities
(> 1% by weight):** None

**Maximum content of
residual monomers:** 0.49%

Additives/Adjuvants: None

5. INDUSTRIAL USE

The notified polymer will be used as a dispersant for mineral slurries.

6. OCCUPATIONAL EXPOSURE

The notified polymer will be imported in 200 L steel drums at a rate of 100 - 500 tonnes per year for the first 5 years.

The polymer emulsion will be sold to possibly 5 mining sites. At each site the process by which the polymer emulsion is added to mineral slurries typically involves pumping the emulsion from the drum into a reservoir attached to a large mixing vessel containing the slurry. The emulsion is then metered into the slurry as it is mixed. The final concentration of the notified polymer in the slurry is approximately 0.2% (w/w). At each site where this process is carried out, approximately 10 workers may be exposed to the notified polymer for 8 hours per day, up to 200 days per year.

The mineral slurries will be used by manufacturers of paper and ceramics. In ceramic manufacture, the mineral slurries will be baked to the surface of ceramic products such as baths and tiles and the process is expected to be highly automated. In paper making, the slurries would be further diluted with large volumes of water. The process involves application of pigments including the slurries in water to the surface of the web with an adhesive present to hold the pigment in place when the paper is dried. Again, the process is typically highly automated. The number of workers involved for each

use is uncertain but ceramic manufacture may involve 50 sites and paper manufacture 10 sites with the duration of exposure being up to 8 hours per day, 200 days per year.

7. PUBLIC EXPOSURE

The handling of paper containing small amounts of the notified polymer is expected to be the major source of public contact. Nevertheless, this is expected to be minimal. At high temperatures (eg. during burning of paper waste) the polymer will degrade to oxides of carbon, nitrogen, hydrogen and phosphorus.

In the case of accidental spillage during transport, the public may be exposed to the notified polymer.

8. ENVIRONMENTAL EXPOSURE

. Release

Mining Use

The formulation of mineral slurries after the mining and crushing is a highly efficient closed system process and will result in essentially no release of the modified acrylic polymer to the environment. The use concentration of the polymer in the mineral slurries will be approximately 0.1 %w/w for the notified substance. The polymer is not expected to be released to the environment as it is bound to minerals in the slurry and is not in excess. With reasonable control technology (primarily spill control equipment) releases to the environment in the event of a spill or leak are not anticipated.

. Fate

Paper Manufacture

The mineral slurry containing the notified substance is diluted with large quantities water and mixed with other additives that are then used to fill and coat the surface of the paper as it is being manufactured in large pulp and paper processing machinery. This is a closed loop process where "Whitewater" from papermaking is typically recirculated after ingredient recharge. Any waste is subjected to primary treatment to remove suspended solids as well as secondary treatment to lower the biological oxygen demand. Discharge then occurs to the municipal wastewater treatment plant for further processing before release to receiving waters. The notified substance (being surface active) would remain with the mineral slurry which in turn attached to the paper pulp that makes up the sludge in the on site primary treatment. This sludge is disposed to landfill.

After use, the coated paper products are expected to be recycled, incinerated or disposed in landfill. The polymer would remain with the paper and follow its fate.

Ceramic Manufacture

Ceramic products moulded from the mineral slurry containing the notified substance are baked to hardness. The finished articles are not expected to contain the polymer as it is anticipated it will decompose (thermal degradation of the polymer takes place above 290 °C) in the kiln to oxides of sulphur, phosphorus and carbon.

9. EVALUATION OF TOXICOLOGICAL DATA

The *Industrial Chemicals (Notification and Assessment) Act 1989* does not require the provision of toxicological data for polymers of number-average molecular weight greater than 1,000. No data are available for the notified chemical. However, a summary of data was supplied for related polymers as described below.

In range finding studies polyacrylic acid neutralised with NaOH was found to have an acute oral LD₅₀ > 5000 mg/kg in rats, an acute dermal LD₅₀ > 5000 mg/kg in rabbits, was not a skin irritant in rabbits and was a very slight eye irritant in rabbits.

Bisulfite terminated polyacrylic acid, ammonium salt was found to have an acute oral LD₅₀ > 5000 mg/kg in rats, an acute dermal LD₅₀ > 5000 mg/kg in rabbits, was a very slight skin irritant in rabbits and was not an eye irritant in rabbits.

Polyacrylic acid (50% solids) in range finding studies was found to have an acute oral LD₅₀ > 5000 mg/kg in rats, an acute dermal LD₅₀ > 5000 mg/kg in rabbits, was not a skin irritant in rabbits and was a slight eye irritant in rabbits.

Sodium polyacrylate (40% solids) in range finding studies was found to have an acute oral LD₅₀ > 5000 mg/kg in rats, an acute dermal LD₅₀ > 5000 mg/kg in rabbits, was a slight skin irritant in rabbits and was a slight eye irritant in rabbits.

It can be concluded from the above studies that the notified polymer is likely to exhibit low oral toxicity in rats, low dermal toxicity in rabbits and, at most, may be a slight skin and eye irritant in rabbits.

10. ASSESSMENT OF ENVIRONMENTAL EFFECTS

No ecotoxicological data were provided for the product Acumer 9400, which is acceptable for polymers of NAMW > 1000 according to the *Act*.

However data on ecotoxicity for polymers of a claimed similar structure and function were provided. All show low toxicity to aquatic species. The notifier has been unable to provide the identities of these polymers. However, this is acceptable as the notifier is not required to supply this information.

Polyacrylic acid is known to be moderately toxic to green alga (6). However, toxicity is known to be mitigated by salt formation.

11. ASSESSMENT OF ENVIRONMENTAL HAZARD

The polymer is unlikely to present a hazard to the environment when it is transported, stored mixed and used in the manner described.

The polymer is also unlikely to be hazardous to aquatic organisms due to the polymer's high molecular weight.

The paper making process waste and end use products containing the notified product are usually consigned to landfill or recycled at the end of their useful life. Environmental hazard is expected to be low.

12. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY EFFECTS

The notified polymer has a NAMW > 1000 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 (1). This is supported by the results of acute toxicity tests on a number of similar polymers which suggest that the notified polymer is likely to exhibit low acute oral and dermal toxicity and, at most, may be a slight skin and eye irritant.

During addition of the emulsion containing the notified polymer to mineral slurries, exposure is expected to be minimal under normal conditions through the use of closed systems. During use of the mineral slurries containing the notified polymer, exposure is also expected to be minimal as the concentration of the polymer is very low (0.2% w/w).

Public contact with the notified polymer is only expected in handling paper products containing it and this exposure is expected to be minimal.

It can be concluded that there is a low risk of adverse health effects to workers or the public during transport, storage or use of the notified polymer.

13. RECOMMENDATIONS

To minimise occupational exposure to Acumer 9400 polymer the following guidelines and precautions should be observed:

- . if engineering controls and work practices are insufficient to reduce exposure to a safe level, then personal protective devices which conform to and are used in accordance with Australian Standards (AS) for eye protection (AS 1336, AS 1337) (2,3), impermeable gloves (AS 2161) (4) and should be worn. Overalls also should be worn.;
- . good personal hygiene should be practised;
- . work practices should be implemented to avoid spills which should be cleaned up promptly and disposed of in accordance with the recommendations contained in the Material Safety Data Sheet (MSDS);
- . a copy of the MSDS should be easily accessible to employees.

14. MATERIAL SAFETY DATA SHEET

The attached MSDS for Acumer 9400 polymer was provided in Worksafe Australia format (5).

This MSDS was provided by Rohm and Haas Australia Pty Ltd as part of their notification statement. 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*, secondary notification of Acumer 9400 polymer 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. National Occupational Health and Safety Commission, Approved Criteria for Classifying Hazardous Substances [NOHSC:1008], AGPS, Canberra, 1994.
2. Australian Standard 1336-1982, Recommended Practices for Eye Protection in the Industrial Environment, Standards Association of Australia Publ., Sydney, 1982.
3. Australian Standard 1337-1984, Eye Protectors for Industrial Applications, Standards Association of Australia Publ., Sydney, 1984.

4. Australian Standard 2161-1978, Industrial Safety Gloves and Mittens (excluding Electrical and Medical Gloves), Standards Association of Australia Publ., Sydney, 1978.
5. National Occupational Health and Safety Commission, Guidance Note for the Completion of a Material Safety Data Sheet, 2nd. edition, AGPS, Canberra, 1990.
6. Nabholz JV, Miller P, Zeeman M 1993. *Environmental Risk Assessment of New Chemicals Under the Toxic Substances Control Act (TSCA) Section Five*. In "Environmental Toxicology and Risk Assessment." ASTM STP 1179. G Landis, JS Hughes, MA Lewis (eds). American Society for Testing and Minerals, Philadelphia. pp 40-45