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**NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION
AND ASSESSMENT SCHEME**

FULL PUBLIC REPORT

EvCote P56-100

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

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Copies of this full public report may also be requested, free of charge, by contacting the Administration Coordinator on the fax number below.

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FULL PUBLIC REPORT**EvCote P56-100****1. APPLICANT**

Asia Pacific Specialty Chemicals Limited (APS) of 15 Park Road SEVEN HILLS NSW 2147 (ABN 32 000 316 138) has submitted a notification statement in support of their application for an assessment certificate for the synthetic polymer of low concern (PLC) Evcote P56-100.

2. IDENTITY OF THE CHEMICAL

The chemical name, CAS number, molecular and structural formulae, molecular weight, spectral data, exact import volume and details of the polymer composition have been exempted from publication in the Full Public Report.

Marketing names: EvCote P56-100

An aqueous dispersion containing up to 25% notified polymer will be marketed as EvCote P56 Dispersion.

Reactive functional groups: carboxylic acid (low concern)

Functional group equivalent weight (FGEW): 1951

Hazardous impurities (other than residual monomers and reactants): None

Non-hazardous impurities at 1% by weight or more: None

Additives/adjuvants: None

3. POLYMER COMPOSITION AND PURITY

Details of the polymer composition have been exempted from publication in the Full Public Report. Purity of the notified chemical is high.

4. PLC JUSTIFICATION

The notified polymer meets the PLC criteria.

5. PHYSICAL AND CHEMICAL PROPERTIES

Property	Result	Comments
Appearance	Light amber colour solid or powder	
Melting point	92°C	
Density	1130 kg/m ³	
Water solubility	< 0.0015%	
Particle size	12% < 250 microns	(See comments below)
Flammability	Not flammable. Combustible	
Autoignition temperature	Not applicable	
Explosive properties	Dust/air mixtures may be explosive; minimum ignition temperature of a dust cloud is approximately 390°C	
Stability/reactivity	Not reactive; stable under normal conditions; will not depolymerize at standard temperatures and a pH range of 6 – 8	
Hydrolysis as function of pH	Not provided	
Partition coefficient	Not provided	
Adsorption/desorption	Not provided	
Dissociation constant	Not provided	

5.1 Comments on physical and chemical properties

The manufactured polymer will be used in the form of a dispersion, rather than as a solid. This will be achieved either by diluting the polymer to a dispersion immediately after reaction, or by allowing it to solidify and later crushing it to facilitate preparation of the dispersion. The particle size composition of the crushed polymer will depend on the milling process and the screen aperture that is used. Sieve testing on a sample of provided from the US gave the following information on particle size:

<i>Particle size</i>	<i>Percentage of sample retained</i>
> 1 mm	37.9
Between 1 mm and 600 microns	23.0
Between 600 and 250 microns	27.0
< 250 microns	12

Water solubility of the notified polymer was determined by gravimetric analysis. The polymer (15 g) was added to distilled water (10 mL) and the resulting slurry was stirred for 24 hours. The slurry was then filtered (0.2 mm syringe filter). The resulting filtrate was placed in a tared drying dish and dried to constant weight at 105°C. The water solubility was calculated from the ratio of soluble material recovered to initial sample weight and was found to be less than 0.0015% or less than 22.5 mg/L.

The notified polymer contains ester linkages that could be expected to undergo hydrolysis under extreme pH conditions. However, in the environmental pH range of 4 to 9, significant hydrolysis is unlikely to occur.

The partition coefficient of the notified polymer has not been determined due to the low water solubility and its likely hydrophobic nature, indicative of partitioning into the octanol phase.

No adsorption/desorption tests were conducted for this notification. However, the notified polymer is expected to be relatively immobile in soil due to its high molecular weight and low water solubility.

No dissociation constant tests were conducted for this notification. However, the notified polymer contains carboxylic acid functionality (pKa between 4-5), which would be expected to dissociate under basic conditions (> pH 9).

6. USE, VOLUME AND FORMULATION

The notifier estimates that < 10 000 tonnes/year will be manufactured and/or imported for the first five years.

Use:

The notified polymer will be used in the form of an aqueous dispersion containing up to 25% polymer as a strength enhancer and moisture barrier coating for paper and paper products.

Formulation details:

The notified polymer may initially be imported into Australia in solid form in 25 kg multi-walled bags. During manufacture of the notified polymer within Australia the raw materials will be charged to the reactor (an 8 000 L registered pressure vessel fitted with two condensers), stirred and the prescribed thermal cycle followed. Water vapours collected during the condensation polymerisation reaction will be returned to the reaction vessel. The standard cycle for one batch of polymer is 16 hours in length. Polymer manufacture will be carried out on a campaign basis, so cleaning of the equipment between batches will not be required.

After manufacture the notified polymer will either be pneumatically pumped into 200 L open head drums where it will be allowed to solidify (Evcote P56-100), or manually transferred to adjacent jacketed blending vessels (12 000 L capacity) containing water and ammonia, and diluted to an aqueous dispersion containing up to 25% of the notified polymer (EvCote P56

Dispersion). Dispersion will be performed at approximately 80°C in a blending vessel which has extraction connected to a scrubber.

If allowed to solidify, the notified polymer will be crushed to a coarse powder in a mill before being charged to a blending vessel where mechanical stirring will be used to create the aqueous dispersion. These processes will occur under local exhaust ventilation. Dispersions created by both methods will be pneumatically pumped to 1 000 L mini tanks after formulation.

The dispersion will be transferred to a warehouse for storage before being despatched to customers. At the customer's site, dedicated transfer hoses and pneumatic pumps will be used to transfer the dispersion from the holding tanks to the bath of a puddle press. The bath of the puddle press will be open to the atmosphere. As the paper travels through the coating tank, the dispersion will be absorbed on to the paper. The paper will then travel through the drying chamber, where water vapour will be collected by the extraction system of the papermaking machine. Local exhaust ventilation will be present above the coating bath on the papermaking machine.

7. OCCUPATIONAL EXPOSURE

Exposure route	Exposure details	Controls indicated by notifier
<i>Manufacture</i>		
<i>Mixing of raw materials, crushing of polymer and blending to dispersion (maximum 2^a chemical plant operators, maximum 10 workers; 1.5 hours/day, 80 days/year^b)</i>		
Respiratory, ocular	Workers may be exposed to airborne particulates generated during mixing of raw materials, crushing of the solid polymer and blending of crushed the polymer to a dispersion.	Mixing operations are enclosed; crushing and blending take place under local exhaust ventilation; plant operators wear protective clothing including overalls, safety glasses, gloves and safety footwear.
<i>Loading of polymer into dispersion tank (maximum 2^a chemical plant operators, maximum 10 workers; 1.5 hours/day, 80 days/year^b)</i>		
Dermal, respiratory	Worker exposure is possible as the polymer will be manually loaded into the dispersion tank.	Plant operators wear protective clothing including overalls, safety glasses, gloves and safety footwear.
<i>Packing off of the polymer into drums; packing off of the dispersion into tanks (maximum 2^a chemical plant operators, maximum 10 workers; 1.5 hours/day, 80 days/year^b)</i>		
Dermal, respiratory	Worker exposure is possible in the event of accidental spillage at the filling station during packing off of the polymer into drums or packing off of the dispersion into tanks.	Plant operators wear protective clothing including overalls, safety glasses, gloves and safety footwear.
<i>Quality control testing (maximum 10 technicians; 1.5 hours/day; 80 days/year)</i>		

Dermal	Dermal contact from drips and spills is possible during testing of samples	Laboratory coats, safety glasses, safety footwear and gloves are worn.
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Paper Treatment

Application of dispersion to paper (overall exposure of workers depends on the range of paper products to which the polymer will be applied; estimated 2 hours/day)

Dermal	Dermal exposure is possible from drips and spills when the dispersion is added to coating systems on the paper making machines.	Suitable protective clothing including overalls, gloves, safety glasses and safety footwear are worn.
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Transport and storage

Unpacking, storage and transport of multiwalled bags; transport and storage of mini tanks (approximately 10 workers)

Dermal	Possible dermal exposure if accidental spillage occurs and clean-up is required.	None specified
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^aNormally 1 chemical plant operator will be exposed to the notified polymer.

^bThe notifier estimates that plant operators may be exposed to the notified polymer for a total maximum of 1.5 hours/day 80 days/year during the manufacturing, crushing/blending and packing-off processes.

8. PUBLIC EXPOSURE

The public will come into contact with paper products that have been coated with the notified polymer. However, once applied to the paper products and dried, the notified polymer is expected to form a durable coating which is not easily removed. Therefore, the notified polymer is not expected to be bioavailable.

9. ENVIRONMENTAL EXPOSURE

9.1. Release

The notifier has indicated that losses of the notified polymer due to manufacture, formulation and cleaning of equipment will be up to 1% of the import volume, which equates to 100 tonnes per annum. Wastes generated during the cleaning of equipment will be removed via transfer lines to the trade waste treatment plant at the notifier's site where they will be processed. Residual sludge from the waste treatment process will be further treated at the Lidcombe waste treatment plant. It is likely that, due to its low water solubility, the notified polymer will associate with sludges and be disposed of to landfill.

The notifier has stated that when 200 L drums are used to store the polymer on an interim basis, these will be sold to drum reconditioners for reprocessing. Empty packaging, such as plastic import bags, will be disposed of to landfill. The notifier estimates that up to 50 g of residual notified polymer per import bag will be disposed of to landfill. Therefore, up to an additional 200 kg of notified polymer could go to landfill as residues in empty import bags.

The notifier has stated that release to the aquatic compartment from the paper coating process is expected to be minimal. Wastewater generated from the cleaning of the paper coating machines will be treated prior to release. At the effluent treatment plant, the notified polymer will be removed with a polyacrylamide surfactant and the resulting solids will be collected with rotary drum filters and disposed of to landfill. It is estimated that a further 1% of the import volume (100 tonnes) per annum could be disposed of to landfill from this route.

The bulk of the polymer is likely to ultimately reside in landfill, either as a result of the disposal of paper products to which it is bound, or the disposal of sludge from the recycling of waste paper and cartons etc. Some of the products coated with the notified polymer may also be incinerated.

9.2. Fate

The majority of the notified polymer will share the fate of the paper substrates to which it is bound. Waste paper products containing the notified polymer will be disposed of in landfill, recycled or incinerated. During recycling, the notified polymer is expected to associate with sludge and will be disposed of in landfill or incinerated. The notifier indicates that aqueous wastes will be treated with a polyacrylamide surfactant to remove suspended solids, which will be disposed of in landfill, prior to the water being discharged into sewer.

In landfill, it is expected that the polymer will slowly break down and become part of the soil matrix and is unlikely to leach due to its low water solubility. Any of the ammonium salt of the notified polymer that passes through the treatment process and enters the sewer is expected to dilute and disperse and eventually partition to the sediments through conversion to the acid form. The incineration of polymer wastes would yield water vapour and oxides of carbon.

The polymer is not expected to cross biological membranes, due to its high molecular weight and low water solubility and, as such, should not bioaccumulate (Connell, 1990).

10. EVALUATION OF HEALTH EFFECTS DATA

No toxicological data were provided.

11. EVALUATION OF ENVIRONMENTAL EFFECTS DATA

No ecotoxicological data were provided.

12. ENVIRONMENTAL RISK ASSESSMENT

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The polymer's high molecular weight and expected low water solubility should prevent bioaccumulation.

Given the above considerations, the overall environmental risk is expected to be low.

13. HEALTH AND SAFETY RISK ASSESSMENT

13.1. Hazard assessment

No toxicological data were provided for the notified polymer. The polymer meets the criteria for a synthetic polymer of low concern and is therefore not classified as a hazardous substance in accordance with the NOHSC Approved Criteria For Classifying Hazardous Substances (NOHSC, 1999).

The MSDS for the notified polymer lists a number of potential health effects based on products of similar composition, namely irritation of the gastrointestinal tract with upper abdominal pain, nausea, vomiting and diarrhoea if swallowed, irritation of the eye with discomfort or blurring (resulting in eye damage if exposure is prolonged), irritation of the skin following prolonged exposure and irritation of the upper respiratory passages following overexposure by inhalation. These effects are related to the physical characteristics of polymer particles. The MSDS for the aqueous polymer dispersion lists similar potential health effects.

13.2. Occupational health and safety

There is little potential for significant occupational exposure during transport and storage of the notified polymer and its dispersion except in the event of accidental spillage. It is not anticipated that workers involved in transport and storage of the notified polymer would be exposed during normal operations.

During crushing of the solid polymer and blending of the crushed polymer into an aqueous dispersion in the reactor, there is potential for respiratory and ocular exposure. There is no NOHSC exposure standard for the notified polymer itself, however the NOHSC exposure standard for dust not otherwise specified is 10 mg/m^3 (NOHSC, 1995). As the crushing and blending processes occur under local exhaust ventilation, respiratory exposure is unlikely and the level of 10 mg/m^3 is unlikely to be attained. Standard personal protective measures used during plant operation including the use of overalls, safety glasses, gloves and safety footwear. The health risk of workers during crushing and blending is expected to be low.

During packing off of the polymer into drums and packing off of the dispersion into tanks, there is the potential for dermal and respiratory exposure to the notified polymer in the event

of accidental spillage at the filling station. Given the expected low hazard of the notified polymer and that exposure will be controlled through the standard protective measures including overalls, safety glasses, gloves and safety footwear, the health risk to workers during the packing off of the polymer and its dispersion is low.

During quality control testing of samples of the polymer during manufacture and application of the dispersion to paper the main route of exposure will be dermal. Exposure to the notified polymer and its dispersion will be controlled through the use of laboratory coats (during quality control), overalls (during application of the dispersion to paper), safety glasses, safety footwear and gloves. Given the expected low hazard of the notified polymer, the health risk to workers during these processes will be low.

Conclusion

The notified polymer is of low concern to human health and safety. The standard control measures used during plant operation and protective measures during quality control and application of the dispersion to paper will ensure sufficient protection against the notified polymer.

13.3. Public health

The notified polymer is intended for use by paper manufacturers and will not be sold to the public. Following application, the notified polymer will form a durable coating that is not expected to be easily removable. Therefore, the health risk to the public from exposure to the notified polymer is considered to be low.

14. MSDS AND LABEL ASSESSMENT

14.1. MSDS

The MSDS of the notified polymer (and products containing the polymer) provided by the notifier were in accordance with the NOHSC *National Code of Practice for the Preparation of Material Safety Data Sheets* (NOHSC, 1994a). They are published here as part of the assessment report. The accuracy of the information on the MSDS remains the responsibility of the applicant.

14.2. Label

The label for the notified polymer provided by the notifier was in accordance with the NOHSC *National Code of Practice for the Labelling of Workplace Substances* (NOHSC, 1994b). The accuracy of the information on the label remains the responsibility of the applicant.

15. RECOMMENDATIONS

Control Measures

No specific precautions are required to control exposure to the notified polymer. However, in the interests of good occupational health and safety, the following guidelines and precautions should be observed:

- Employers should implement the following engineering controls to minimise occupational exposure:
 - Exhaust ventilation during manufacture, blending, crushing and filling process
 - Enclosed and automated manufacture process
- Employers should implement the following safe work practices to minimise occupational exposure:
 - During manual transfer of notified polymer and polymer dispersion into reaction tanks and coating bath, avoid spills and splashing
 - Avoid generation of dust clouds when handling the polymer in powder form
- Employers should ensure that the following personal protective equipment is used by workers to minimise occupational exposure to the notified polymer:
 - Chemical resistant gloves
 - Protective clothing which protects the body, arms and legs
 - Eye protection when splashes are generated
 - A dust mask when dusts are generated

Guidance in selection of personal protective equipment can be obtained from Australian, Australian/New Zealand or other approved standards.
- A copy of the MSDS should be easily accessible to employees.

If products and mixtures containing the notified polymer are classified as hazardous to health in accordance with the NOHSC *Approved Criteria for Classifying Hazardous Substances*, workplace practices and control procedures consistent with provisions of State and Territory hazardous substances legislation must be in operation.

16. REQUIREMENTS FOR SECONDARY NOTIFICATION

Secondary notification may be required if:

- (i) any of the circumstances stipulated under subsection 64(2) of the Act arise. If any importer or manufacturer of the notified polymer becomes aware of any of these circumstances, they must notify the Director within 28 days; or
- (ii) the notified polymer is introduced in a chemical form that does not meet the PLC criteria.

17. REFERENCES

Connell D. W. (1990) General Characteristics of Organic Compounds Which Exhibit Bioaccumulation. In Connell D. W., (Ed) Bioaccumulation of Xenobiotic Compounds. CRC Press, Boca Raton, USA.

National Occupational Health and Safety Commission (1994a) National Code of Practice for the Preparation of Material Safety Data Sheets [NOHSC:2011(1994)]. Australian Government Publishing Service, Canberra.

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