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NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME

FULL PUBLIC REPORT

Polymer in CYMEL+659 Resin

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Telephone: (61) (02) 9577 9514 FAX (61) (02) 9577 9465

Director
Chemicals Notification and Assessment

FULL PUBLIC REPORT

Polymer in CYMEL+659 Resin

1. APPLICANT

Cytec Australia Holdings PTY LTD of Suite 1, First Floor, 7-11 Railway Road Baulkham Hills NSW 2153 (ACN: 081 148 629) has submitted a notification statement in support of their application for an assessment certificate for Polymer in CYMEL+ 659 Resin.

2. IDENTITY OF POLYMER

The chemical name, CAS number, molecular and structural formulae, molecular weight, spectral data, details of the polymer composition, maximum content of residual monomers and use have been exempted from publication in the Full Public Report.

Trade names: CYMEL+ 659 Resin

Reactive functional groups: The polymer does not contain any reactive functional groups.

Molecular weight (MW):

Number-average MW	Weight-average MW	MW < 1000	MW < 500	Method
1440	8710	20%	9.5%	GPC

Polydispersity: 6.05

Structural identification method: The polymer was detected by infrared (IR) spectroscopy.

3. POLYMER COMPOSITION AND PURITY

Degree of Purity: > 99%

Maximum Content of Residual Monomers: 0.3% (The identity of residual monomers are exempt from publication)

Hazardous impurities: None

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

Additives/adjuvants:

Chemical name	Synonym	CAS no.	% weight
1,2-Dimethylbenzene	Xylene, methyltoluene, xylol.	95-47-6	28-32%

4. PLC JUSTIFICATION

The notified polymer meets the PLC criteria.

5. PHYSICAL AND CHEMICAL PROPERTIES

The notified polymer is never isolated as a defined entity. Physical and chemical data were not provided for the notified polymer or the notified polymer in xylene. Unless stated otherwise, all data provided is for the imported product CYMEL+ 659 Resin, containing the notified polymer at a maximum concentration of 0.13%. Butanol is present at 19-21% concentration and where stated the data is for the butanol.

Property	Result	Comments
Appearance	Colourless viscous liquid	
Boiling point	117-118ºC (butanol)	
Density	1.01 g/cm^3 at 15.5ºC	
Water solubility	Not soluble (notified polymer)	Determined using a visual non-standard method.
Particle size	Not determined	The notified polymer is never isolated from xylene solution.
Flammability	Not determined	The notified polymer is not expected to be flammable.
Autoignition temperature	345ºC (butanol)	
Explosive properties	Not determined	The notified polymer is not expected to be explosive.
Stability/reactivity	Not determined	The notified polymer is not expected to be reactive.
Vapour pressure	0.93 kPa at 20ºC (butanol)	
Hydrolysis as function of pH	Not determined	
Dissociation constant	Not determined	
Flash point	28.89ºC (butanol)	Determined using the Closed Cup method.

5.1 Comments on physical and chemical properties

The data provided are acceptable for a polymer of low concern. The notified polymer is expected to remain stable under ambient conditions. It will, however, start to decompose at high temperatures, generating oxides of carbon.

The polymer is not expected to be volatile under the conditions of use. The product CYMEL+ 659 Resin is expected to have the same boiling point and vapour pressure as that of butanol.

The water solubility was determined using a visual non-standard method. A sample of 70% notified polymer in xylene was dried to remove the xylene and immersed in water at 10 mg/L and 1 mg/L. None of the samples appeared to dissolve. The notifier concluded that the polymer was not readily soluble at 25-30ºC in water.

The polymer contains organic ester groups that could undergo hydrolysis under extreme pH, but in the environmental pH range between 4 and 9, hydrolysis is unlikely.

Partition coefficient and adsorption/desorption have not been performed due to the low water solubility of the polymer. The partition coefficient is expected to be high and the polymer can be expected to bind strongly to, or be associated with, soil and sediment.

The polymer does not contain dissociable or reactive functional groups.

6. USE, VOLUME AND FORMULATION

Use:
The notified polymer is to be used in the manufacture of heat cured coatings applied internally and externally onto aluminium and steel cans used in the food industry.

Manufacture/Import volume:
52-65 kg of the notified polymer per year will be imported for 5 years as a component of CYMEL+ 659 Resin at 0.03-0.13% in 200L steel drums.

Formulation:
The CYMEL+ 659 Resin solution is reformulated before use in Australia. During reformulation the CYMEL+ 659 Resin solution, containing up to 0.13% notified polymer, is pumped directly from the 200 L drums to a 10 000 L stainless steel mixer where it is blended with other ingredients in a batchwise process to produce paint coatings for use in the food packaging industry. The final paint products, which contain the notified polymer at 0.0013%, are filtered and gravity fed into 200 L steel drums. The reformulation process is fully automated.

7. OCCUPATIONAL EXPOSURE

Exposure route	Exposure details	Controls indicated by notifier
Formulation		
Research and development and QC testing (1 worker)		
dermal	0.13% solution maximum, 1 h/day, 30-40 days/year; workers may be exposed to drips and spills of polymer solution when taking samples for evaluation.	Coveralls and eye protection.
Coatings manufacture and filling line operators (6-10 workers)		
dermal eyes	0.13% solution maximum, 4 h/day, 200 days/year; workers may be exposed to drips and spills of polymer solution when connecting, disconnecting the 200 L drums and when cleaning the blending equipment.	Enclosed mixers fitted with exhaust ventilation, impervious gloves, antistatic coveralls, antistatic footwear and eye protection.
End use		
Dilution of coating (10 workers)		
dermal	0.0013% solution maximum, 16 h/day, 200 days/year; workers may be exposed to drips and spills of coating solution when connecting, disconnecting and cleaning the mixing equipment.	Ventilated area, impervious gloves, antistatic coveralls, antistatic footwear and eye protection.
Addition of coating to food cans and cleaning of spray equipment (10 workers)		
dermal	0.0013% solution maximum, 16 h/day, 200 days/year; workers may be exposed to drips and spill of coating solution when connecting, disconnecting and cleaning the rollercoater equipment.	Fume extraction systems and down draft ventilation, nylon overalls, calico hoods, nylon gloves; air purifying respirators.
Transport and storage		
Transport of drums (2-3 workers)		
none	0.13% solution maximum, 1-2 h/day, 5 days/year; no exposure expected except in case of accident.	Coveralls, protective footwear.
Storage of drums (2-3 workers)		
none	0.13% solution maximum, 1-2 h/day, 5 days/year; no exposure expected except in case of accident.	Coveralls, protective footwear.

Worker Education and Training
Workers are to receive instruction and training in the handling of hazardous chemicals.

Adverse Effect Reporting
The notifier advised that no health effects have been reported from the occupational use of the notified chemical.

8. PUBLIC EXPOSURE

The notified polymer comprises less than 0.0013% of coatings applied to internal and external surfaces of food cans and heat cured. It is expected that public exposure to the notified polymer in its liquid state will be minimal except in the event of an accidental spill. Public exposure via dermal contact with dried surface coatings containing the notified polymer on food cans is expected to be high. There will also be ingestion of canned food in contact with dried surface coatings containing the notified polymer. The notified polymer will be encapsulated within an inert, very high molecular weight film matrix in heat cured surface coatings. This will render the notified polymer biologically unavailable, consequently the public hazard from exposure to the notified polymer through all phases of its life cycle is considered to be low.

9. ENVIRONMENTAL EXPOSURE

Release
There is potential for release of the notified polymer during reformulation and application of the can coating. Reformulation will take place at 2 sites and spills will be contained by the plant bunding.

During reformulation the notifier estimates that up to 2.6 kg per annum of polymer waste will be generated. This will be derived from:

Equipment cleaning	1.3 kg/annum
Spills (volume not given but estimated to be ~1%)	0.65 kg/annum
Residue in the import containers	0.65 kg/annum.

The solid waste from the paint/coatings production will be disposed to landfill by licensed waste disposal contractors. Waste will undergo the "Dusol" reclamation process where the solid resin waste is separated out and disposed to landfill.

The can coatings are applied at reportedly 99% efficiency by roller coating with the following maximum losses expected:

Equipment cleaning and spills	0.00325 kg/annum
Rejected coated material	0.0065 kg/annum
Residue in the empty containers	0.00163 kg/annum
Transfer waste (~1%)	1 kg/annum.

Drums and residue, rejected product and waste from equipment cleaning will be collected by licensed waste disposal contractors and disposed to landfill. The 1% waste lost during

application will be collected in the air and water filters, treated in the water scrubbing systems before disposal, presumably also to landfill.

At the maximum import volume the total release of the notified polymer will be approximately 3.6 kg/annum.

Fate
The fate of the bulk of the polymer will be tied to the fate of food cans to which it is applied. Most used aluminium cans (~64%) and ~30% of the steel cans will be recycled by metal smelting at high temperatures. The polymer will be destroyed by conversion to oxides of carbon and water vapour.

The remainder of the used cans and the waste generated during reformulation and application of the can coatings will be disposed of to landfill sites in dispersive manner. Due to the low solubility and the highly cross linked nature of the polymer, it will not leach but remain associated with soil and sediment. It will undergo slow abiotic and biotic degradation in landfill. Incineration will destroy the polymer.

Due to its high molecular weight the polymer is not expected to cross biological membranes, and should not bioaccumulate (Connell, 1989).

10. EVALUATION OF HEALTH EFFECTS DATA

No toxicological data were submitted.

The health hazards of the constituents and hazardous impurities, additives and adjuvants are tabulated below.

Chemical	Health hazards (NOHSC, 1999a)	Regulatory controls (NOHSC, 1995)
Constituents		
The identities of residual monomers have been exempted from publication in the Full Public Report	None	None
Hazardous impurities		
None	None	None
Additives/adjuvants		
Xylene	Harmful by inhalation and in contact with skin. Irritating to skin (NOHSC, 1999a).	Exposure standard 80 ppm TWA, 150 ppm STEL (NOHSC, 1995).

11. EVALUATION OF ENVIRONMENTAL EFFECTS DATA

No ecotoxicology data were submitted.

12. ENVIRONMENTAL RISK ASSSESSMENT

The majority of the notified polymer associated with waste during the reformulation and application of the can coating should not enter the environment until it is disposed of to landfill. This waste will be derived from reformulation (up to 2.6 kg/annum) and rollercoat application to aluminium and steel food cans (up to 1 kg/annum). Polymer placed into landfill will remain associated with the soil due to its low solubility and high molecular weight and undergo slow abiotic and biotic degradation. The cured coating would be strongly cross-linked into an inert matrix that will be immobile in the environment.

In the event of accidental spillage of the polymer emulsion into waterways, the polymer is expected to remain insoluble and become associated with the bottom sediments of the waterway.

Given the above, environmental exposure and the overall environmental hazard is expected to be low.

13. HEALTH AND SAFETY RISK ASSESSMENT

13.1. Hazard assessment

No toxicological data have been provided for the notified polymer and therefore the substance cannot be classified in accordance with the NOHSC Approved Criteria for Classifying Hazardous Substances (NOHSC, 1999b). The systemic toxicity of the notified polymer is likely to be low, given the high molecular weight and consequent low bioavailability.

The product CYMEL+ 659 Resin is a hazardous substance because of the high concentration of butanol and formaldehyde. It is also classed as a dangerous good (flammable liquid) because of the solvent content. The MSDS for the product CYMEL+ 659 Resin lists a number of potential health effects, namely dizziness, drowsiness, skin sensitisation, skin, eye, nose, throat and respiratory irritation, may cause serious damage to eyes, and may cause cancer. These health effects are anticipated to relate to the range of solvents rather than the notified polymer.

13.2. Occupational health and safety

Import, transport and storage of CYMEL+ 659 Resin will be in 200L drums. Occupational exposure to the notified polymer would only be envisaged following accidental puncture of the drums, and the health risk is assessed as low, given its high molecular weight and low concentration.

The manufacture of paints incorporating the notified polymer is to occur locally on a daily basis. During reformulation the CYMEL+ 659 Resin solution, containing up to 0.13% notified polymer, is pumped directly from the 200 L drums to enclosed 10 000 L stainless steel mixers and blended with other ingredients. The reformulation process is fully automated. The final paint products, which contain the notified polymer at 0.0013%, are and gravity fed into 200 L steel drums. During reformulation workers may be frequently exposed

to drips and spills of the polymer solution, predominantly via the skin and eyes, when connecting and disconnecting the 200 L drums and when cleaning the blending equipment. Mixing and filling are conducted using exhaust ventilation so inhalation exposure is unlikely. Exposure will be controlled also by personal protective equipment such as impervious gloves, antistatic coveralls, antistatic footwear and eye protection. Given these engineering and personal controls and the expected low toxicity of the notified polymer, the health risk to workers during reformulation would be assessed as low.

The final paint products will be transported in 200L drums to a food can manufacturer who will apply the coating using rollercoater techniques. The manufacturer pumps the final paint products from the 200 L drums to a circulation tank or an intermediate tank and diluted by 5%, then applied using rollercoater equipment. Dilution of the final paint product occurs in ventilated coating rooms while the application procedure occurs in a designated area with a fume extraction system. Worker exposure will be limited by these engineering controls as well as the use of personal protective equipment such as nylon overalls and gloves, calico hoods, antistatic footwear, eye protection and air purifying respirators. Under these circumstances, given the low concentration and expected low toxicity of the notified polymer and the equipment used to control exposure, the health risk is considered low.

CYMEL+ 659 Resin contains extra ingredients including potentially hazardous solvents such as butanol, formaldehyde, xylol and methanol and it is important that appropriate measures are taken to control exposure to these components. Employers should ensure that the exposure standards for the solvents are adhered to in the workplace.

Following heat curing of the paint applied by rollercoating, the polymer will be cross-linked with other paint components to form a high molecular weight stable film. In this form, the polymer is essentially unavailable for absorption and the health risk to workers from the notified polymer after paint curing would be negligible.

13.3. Public health

The public will come into contact with the notified polymer only after it has been applied to and becomes encapsulated within an inert, very high molecular weight film matrix on the internal and external surfaces of food cans. This will render the notified polymer biologically unavailable, consequently the public risk from exposure to the notified polymer through all phases of its life cycle, is considered to be low.

14. MSDS AND LABEL ASSESSMENT

14.1. MSDS

The MSDS for the manufactured resin containing the notified polymer was provided by the notifier for assessment. It is published here as part of the assessment report.
The MSDS of the product CYMEL+ 659 Resin provided by the notifier was in accordance with the NOHSC *National Code of Practice for the Preparation of Material Safety Data Sheets* (NOHSC, 1994a). It is 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 product CYMEL+ 659 Resin 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

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

- Protective eyewear, chemical resistant industrial clothing and footwear and impermeable gloves should be used during occupational use of the products containing the notified polymer; where engineering controls and work practices do not reduce vapour and particulate exposure to safe levels, an air fed respirator should also be used;
- Spillage of the notified chemical should be avoided. Spillages should be cleaned up promptly with absorbents which should then be put into containers for disposal;
- Employers should ensure that NOHSC exposure standards for all of the components of the polymer solution are not exceeded in the workplace;
- Good personal hygiene should be practised to minimise the potential for ingestion;
- A copy of the MSDS should be easily accessible to employees.

If products containing the notified chemical are hazardous to health in accordance with the NOHSC *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 1999b), workplace practices and control procedures consistent with State and territory hazardous substances regulations must be in operation.

Guidance in selection of protective eyewear may be obtained from Australian Standard (AS) 1336 (Standards Australia, 1994) and Australian/New Zealand Standard (AS/NZS) 1337 (Standards Australia/Standards New Zealand, 1992); for industrial clothing, guidance may be found in AS 3765.2 (Standards Australia, 1990); for impermeable gloves or mittens, in AS 2161.2 (Standards Australia/ Standards New Zealand, 1998); for occupational footwear, in AS/NZS 2210 (Standards Australia/ Standards New Zealand, 1994a); for respirators, in AS/NZS 1715 (Standards Australia/ Standards New Zealand, 1994b) and AS/NZS 1716 (Standards Australia/ Standards New Zealand, 1994c).

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 chemical 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

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National Occupational Health and Safety Commission (1999a) List of Designated Hazardous Substances [NOHSC:10005(1999)]. Australian Government Publishing Service, Canberra.

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National Occupational Health and Safety Commission (1995) Adopted National Exposure Standards for Atmospheric Contaminants in the Occupational Environment, [NOHSC:1003(1995)]. In: Exposure Standards for Atmospheric Contaminants in the Occupational Environment: Guidance Note and National Exposure Standards. Australian Government Publishing Service, Canberra.

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Standards Australia (1990) Australian Standard 3765.2-1990, Clothing for Protection against Hazardous Chemicals Part 2 Limited protection against specific chemicals. Standards Association of Australia.

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