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**NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION
AND ASSESSMENT SCHEME**

FULL PUBLIC REPORT

POLYMER in ADCOTE E700A

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For enquiries please contact the Administration Coordinator at:

Street Address: 92 -94 Parramatta Rd CAMPERDOWN NSW 2050, AUSTRALIA
Postal Address: GPO Box 58, SYDNEY NSW 2001, AUSTRALIA
Telephone: (61) (02) 9577 9514 FAX (61) (02) 9577 9465

Director
Chemicals Notification and Assessment

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FULL PUBLIC REPORT**POLYMER in ADCOTE E700A****1. APPLICANT**

Rohm and Haas Australia Pty Ltd of 969 Burke Road CAMBERWELL VIC 3124 (ACN 004 513 188) and Coates Brothers Australia Pty Ltd of 323 Chisholm Road AUBURN NSW 2144 (ACN 000 079 550) have submitted a joint limited notification statement in support of their application for an assessment certificate for Polymer in Adcote E700A.

2. IDENTITY OF THE CHEMICAL

The chemical name, CAS number, molecular and structural formulae, molecular weight, spectral data, details of the polymer composition and details of hazardous and non-hazardous impurities and customers have been exempted from publication in the Full Public Report and the Summary Report.

Marketing Name: Polymer in Adcote E700A

3. PHYSICAL AND CHEMICAL PROPERTIES

The following physico-chemical data are from Adcote E700A polymer solution, unless otherwise stated.

Appearance at 20°C & 101.3 kPa: Amber liquid; fragrant odour (ethyl acetate odour)

Boiling Point: 77°C (ethyl acetate)

Specific Gravity: 1.1

Vapour Pressure: 10 KPa at 20°C

Water Solubility: Not provided, expected to be insignificant due to high molecular weight and high proportion of hydrophobic functional groups.

Partition Co-efficient (n-octanol/water): Not determined (water solubility is expected to be insignificant).

Hydrolysis as a Function of pH: The notified polymer contains functional groups that may undergo hydrolysis under extreme temperature and pH.

Adsorption/Desorption:	The notified polymer is expected to be immobile in soil due to the high molecular weight, the monomer composition, and the expected low solubility in water.
Dissociation Constant:	The polymer does not contain any groups which can undergo dissociation
Flash Point:	-4°C (ethyl acetate)
Flammability Limits:	Ethyl acetate: Upper Explosive Limit = 11.5% Lower Explosive Limit = 2.2%
Autoignition Temperature:	426°C (ethyl acetate)
Explosive Properties:	The notified polymer is stable and is not explosive.
Reactivity/Stability:	Not reactive

3.1 Comments on Physico-Chemical Properties

The vapour pressure of the notified polymer is likely to be low considering the high molecular weight of the polymer.

The notified polymer contains terminal reactive functional groups. The Material Safety Data Sheet (MSDS) indicates that the polymer is stable under normal conditions.

4. PURITY OF THE CHEMICAL

Degree of Purity: High purity.

Hazardous Impurities (Residual monomer)

<i>Chemical name:</i>	1,1'-methylenebis[4-isocyanatobenzene]
<i>Synonyms:</i>	Methylene bisphenyl isocyanate (MDI)
<i>CAS No.:</i>	101-68-8
<i>Weight percentage:</i>	2.2
<i>Toxic properties:</i>	R20, R36/37/38, R42

Non-hazardous Impurities (> 1% by weight): None

Additives/Adjuvants: Ethyl acetate

5. USE, VOLUME AND FORMULATION

The notified polymer is one component of two pack laminating adhesive for polymer and/or aluminium films used to package dry food (eg potato crisps).

The notified polymer will not be manufactured in Australia, but will be imported as a 40-70% component in the product, Adcote E700A. In Australia, the imported Adcote E700A will be blended with other ingredients to form an adhesive. The blended adhesive (containing 30-60% w/w notified polymer) will be applied by a gravure coating process, whereby two polymer and/or aluminium films are laminated together and the adhesive is sandwiched by the films.

The estimated quantity of the notified polymer introduced in Adcote E700A is approximately 100 tonnes in the first year increasing to 200 tonnes per annum after 5 years. Adcote E700A polymer emulsion will be imported in 200L steel drums.

6. OCCUPATIONAL EXPOSURE

Transport and storage

The notifier has estimated that 5 waterside workers and 5-10 transport drivers and warehouse workers will be involved in the transport and storage of the product containing the notified polymer. These workers could be exposed to the notified chemical only in the event of an accident where the packaging is breached.

Laminating machine operator

At the laminating site, Adcote E700A is decanted by gravity from 200 L drums into a mixing vessel of 100-200L capacity. It will be mixed mechanically with another component of the adhesive system in the mixing vessel. The blended adhesive containing 30-60% notified polymer will be pumped mechanically from the mixing vessel to a holding vessel (about 20 L) of the laminating machine then pumped into an adhesive tray below the laminating machine rollers. The blended adhesive is applied by the gravure coating process where two polymers and/or aluminium film are laminated together with the adhesive between the films. Following completion of a run, unused adhesive in the laminating machine tray or reservoir is transferred to a waste drum manually. The adhesive residues on the machinery are washed off manually using rags and ethyl acetate.

There will be 8-15 laminating machine operators who may be exposed to the product containing the notified polymer and the blended adhesive. The maximum potential exposure for laminating machine operators is estimated to be 6-8 hours per day, 100 days per year. The main routes for occupational exposure to the polymer will occur through skin and eye contact. Inhalation exposure to the notified polymer and MDI will not be significant due to their low volatility and concentration, respectively. Workers may be exposed to vapours of ethyl acetate. Laminating machinery operators wear safety glasses, impervious gloves, overalls and safety boots during blending of the adhesive, transfer of the adhesive to laminating machines, and cleaning of the machines. Blending vessels are situated in a bunded area with local exhaust ventilation, while laminating machinery is either fitted with exhaust ventilation ducts above the adhesive tray or in a wall or ceiling adjacent to the

machinery.

Workers at the packaging factories will handle the laminated material and packed dry food where the notified polymer is unavailable for absorption.

7. PUBLIC EXPOSURE

Adcote E700A polymer solution containing 40-70% notified polymer will not be sold to the public. The public will frequently handle packaging containing the notified polymer as a component of adhesive. However, since the notified polymer is "sandwiched" between two impervious polymer and/or aluminium films, food contact with the notified polymer is unlikely and the potential for the public exposure is minimal.

8. ENVIRONMENTAL EXPOSURE

8.1 Release

All of notified polymer will be used for dry food packaging. Some waste will be generated from this use.

During formulation of the adhesive and application, the notifier estimates that up to 2080 kg per annum of notified polymer waste will be generated. This will be derived from:

Spills:	≤ 65 kg/annum
Residues in the import containers:	≤ 650 kg/annum
Equipment cleaning:	< 65 kg/annum
Unused blend:	≤ 1300 kg/annum

It is anticipated that spills of the polymer solution and blended polymer adhesive will be contained within the plant through the bunding systems in place. As the polymer solution will be used in small batch quantities, it is expected that any spills will be small in volume. Spills will be collected using absorbent material and removed by a licensed industrial waste contractor to a licensed waste land-fill site.

Machinery will be manually cleaned with rags and solvent and waste from this process will be disposed to landfill by licensed hazardous waste contractors.

It is expected that import drums containing residual polymer solution will be used to collect waste solvent and unused blended adhesive, and collected by a licensed hazardous waste contractor. The liquid contents will be incinerated and the drums with any residual solid will be disposed of to a licensed waste landfill site.

8.2 Fate

Spills of polymer solution or blended laminating adhesive containing the notified polymer will be collected on absorbent material and disposed of to landfill. Waste generated from cleaning machinery with rags and solvent will also be disposed of to landfill. In landfill, the polymer is unlikely to separate from the absorbent material. Given the expected low water

solubility, any that did separate would be expected to associate with the soil matrix and not leach into the aquatic environment.

Licensed hazardous waste contractors will incinerate residual polymer solution and unused blended adhesive and dispose of the empty import drums with any remaining residual solid material to landfill. Incineration would be expected to produce water vapour and oxides of nitrogen and carbon. In landfill, the polymer would not be expected to escape from the drums, however any that did escape would associate with the soil matrix and not leach into the aquatic environment.

The majority of the notified polymer will follow the fate of dry food packaging, which will mostly be disposed of to domestic landfill. Upon eventual degradation of the packaging films the polymer is expected to become part of the soil matrix and not leach.

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

9. EVALUATION OF TOXICOLOGICAL DATA

No toxicological data were provided.

10. ASSESSMENT OF ENVIRONMENTAL EFFECTS

No ecotoxicological data were provided.

11. ASSESSMENT OF ENVIRONMENTAL HAZARD

Release of the notified polymer to the aquatic environment from spills during formulation is not expected, as processing plants will be bunded and any spills collected on absorbent material and disposed of to landfill. Waste polymer generated from cleaning equipment will be disposed of to landfill. The majority of the notified polymer will follow the fate of dry food packaging and eventually be disposed of to landfill. In landfill, the polymer is unlikely to be mobile in the soil environment and is expected to very slowly degrade to carbon dioxide gas through abiotic and biotic processes. The environmental hazard of the notified polymer in landfill is expected to be low.

Incineration by licensed hazardous waste contractors of the notified polymer in waste from drum residues and unused blended adhesive is expected to produce water vapour and oxides of carbon and nitrogen.

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

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

12. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY EFFECTS

No toxicological data were provided for the notified polymer. Due to its high NAMW, adsorption across biological membranes would be restricted. The notifier has determined that the notified polymer is a hazardous substance, based on residual concentration of MDI and given risk phrases: Irritating to eyes, respiratory system and skin R36/37/38; May cause sensitisation by inhalation R42.

Due to the presence of residual MDI at 1-5%, the imported product Adcote E700A, is classified as a hazardous substance in accordance with the NOHSC *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 1999) with the following risk phrases assigned: Irritating to eyes, respiratory system and skin R36/37/38; May cause sensitisation by inhalation R42.

Due to the presence of ethyl acetate, the product is a Class 3 Dangerous Good with Packing Group II assigned (Highly flammable). Both ethyl acetate and MDI have national exposure standards (NOHSC, 1995; see below).

Occupational health and safety

Dermal exposure to the polymer in Adcote E700A may occur during the blending and transfer of Adcote E700A and the blended adhesive, and when cleaning the laminating equipment. Exposure to residual MDI may also occur during these operations. Exposure to the notified polymer and MDI *via* inhalation is expected to be low due to their low volatility and concentration. Blending vessels are situated in a bunded area with local exhaust ventilation. Laminating machinery is either fitted with exhaust ventilation ducts above the adhesive tray, or in a wall or ceiling adjacent to the machinery.

Due to the health effects of MDI the health risk to laminating operators is of concern, as exposure and therefore irritation of the skin and eyes, and sensitisation may occur during transfer and cleaning operations. Laminating machine operators must wear safety glasses, impervious gloves, overalls and safety boots when handling Adcote E700A and the blended adhesives and respiratory protection must be worn if there is a risk of exposure to MDI. MDI has a NOHSC exposure standard of 0.02 mg/m³ TWA (as isocyanate, equivalent to 0.12 mg/m³ MDI) and 0.07 mg/m³ STEL, with a 'sensitiser' notation. However, it is noted that the ACGIH TLV for MDI is 0.051 mg/m³ TWA (ACGIH 2000)). Precautions to prevent exposure to isocyanates must be taken by all personnel, especially those who have had prior contact or suffer from any form of compromised respiratory function (NOHSC 1990). Isocyanates are on Schedule 3 in NOHSC *Model Regulation for the Control of Workplace Hazardous Substances* – substances for which health surveillance is required (NOHSC 1994a).

The notified polymer becomes unavailable for absorption once it is incorporated in the laminated material. The health risk for workers in the food packaging industry, and in the distribution and retailing snack food is considered to be negligible.

There is little potential for significant health risk to the notified polymer in the transport and storage of the product containing this polymer, unless repeated accidental exposure occurs.

Public health

The notified polymer is not available for sale to the general public and will be used in laminate adhesive products for use in dry food and packaging. Although members of the public may consume food from laminated packages manufactured using the notified polymer, the risk to public health from the notified polymer is likely to be low because it is sandwiched between two impermeable layers and is unlikely to be bioavailable.

13. RECOMMENDATIONS

Due to the presence of the residual monomer, MDI, which is a Schedule 3 sensitiser, health surveillance, must be conducted for workers potentially exposed to Adcote E700A or mixtures containing the adhesive.

To minimise occupational exposure to Polymer in Adcote E700A the following guidelines and precautions should be observed:

- Local exhaust ventilation in all areas where Adcote E700A and mixtures containing Adcote E700A are handled;
- Personal and area atmospheric monitoring should be conducted for workers potentially exposed to MDI in excess of the NOHSC exposure standard of 0.12 mg/m³ TWA. Employers should ensure that other relevant NOHSC exposure standards are not exceeded in the workplace;
- Workers must wear overalls, face/eye protection and rubber or neoprene gloves when handling Adcote E700A or mixtures containing the adhesive. Respiratory protection must be worn if exposure to MDI is possible;
- Spillage of the notified chemical should be avoided. Spillages should be cleaned up promptly with absorbents which should be put into containers for disposal;
- 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, 1999), workplace practices and control procedures consistent with State and Territory hazardous substances regulations must be in operation.

Guidance in selection of goggles 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) or other internationally acceptable standards.

14. MATERIAL SAFETY DATA SHEET

The MSDS for Adcote E700A were provided in a format consistent with the *National Code of Practice for the Preparation of Material Safety Data Sheets* (NOHSC, 1994b).

This MSDS was provided by the applicant as part of the notification statement. It is reproduced here as a matter of public record. The accuracy of this information remains the responsibility of the applicant.

15. REQUIREMENTS FOR SECONDARY NOTIFICATION

Under the Act, the director must be informed if any of the circumstances stipulated under subsection 64(2) of the Act arise, and secondary notification of the notified chemical may be required. No other specific conditions are prescribed.

16. REFERENCES

ACGIH (2000), 2000 TLVs and BEIs.

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 (1990) *Isocyanates*, Australian Government Publishing Service, Canberra.

National Occupational Health and Safety Commission (1994a) *National Model Regulations for the Control of Workplace Hazardous Substances* [NOHSC: 1005 (1994)]. Australian Government Publishing Service, Canberra.

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

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.

National Occupational Health and Safety Commission (1999) *Approved Criteria for Classifying Hazardous Substances* [NOHSC: 1008 (1994)]. Australian Government Publishing Service, Canberra.

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.

Standards Australia (1994) Australian Standard 1336-1994, Eye protection in the Industrial Environment. Standards Association of Australia.

Standards Australia/Standards New Zealand (1992) Australian/New Zealand Standard 1337-1992, Eye Protectors for Industrial Applications. Standards Association of Australia/Standards Association of New Zealand.

Standards Australia/Standards New Zealand (1994) Australian/New Zealand Standard 2210-1994, Occupational Protective Footwear. Standards Association of Australia/Standards Association of New Zealand.

Standards Australia/Standards New Zealand (1994) Australian/New Zealand Standard 1715-1994, Use and Maintenance of Respiratory Protective Devices. Standards Association of Australia/Standards Association of New Zealand.

Standards Australia/Standards New Zealand (1994) Australian/New Zealand Standard 1716-1994, Respiratory Protective Devices. Standards Association of Australia/Standards Association of New Zealand.

Standards Australia/Standards New Zealand (1998) Australian/New Zealand Standard 2161.2-1998, Occupational protective gloves, Part 2: General requirements. Standards Association of Australia/Standards Association of New Zealand.

Attachment 1

The Draize Scale (Draize, 1959) for evaluation of skin reactions is as follows:

<i>Erythema Formation</i>	<i>Rating</i>	<i>Oedema Formation</i>	<i>Rating</i>
No erythema	0	No oedema	0
Very slight erythema (barely perceptible)	1	Very slight oedema (barely perceptible)	1
Well-defined erythema	2	Slight oedema (edges of area well-defined by definite raising)	2
Moderate to severe erythema	3	Moderate oedema (raised approx. 1 mm)	3
Severe erythema (beet redness)	4	Severe oedema (raised more than 1 mm and extending beyond area of exposure)	4

The Draize scale (Draize *et al.*, 1944) for evaluation of eye reactions is as follows:

CORNEA

<i>Opacity</i>	<i>Rating</i>	<i>Area of Cornea involved</i>	<i>Rating</i>
No opacity	0 none	25% or less (not zero)	1
Diffuse area, details of iris clearly visible	1 slight	25% to 50%	2
Easily visible translucent areas, details of iris slightly obscure	2 mild	50% to 75%	3
Opalescent areas, no details of iris visible, size of pupil barely discernible	3 moderate	Greater than 75%	4
Opaque, iris invisible	4 severe		

CONJUNCTIVAE

<i>Redness</i>	<i>Rating</i>	<i>Chemosis</i>	<i>Rating</i>	<i>Discharge</i>	<i>Rating</i>
Vessels normal	0 none	No swelling	0 none	No discharge	0 none
Vessels definitely injected above normal	1 slight	Any swelling above normal	1 slight	Any amount different from normal	1 slight
More diffuse, deeper crimson red with individual vessels not easily discernible	2 mod.	Obvious swelling with partial eversion of lids	2 mild	Discharge with moistening of lids and adjacent hairs	2 mod.
Diffuse beefy red	3 severe	Swelling with lids half-closed	3 mod.	Discharge with moistening of lids and hairs and considerable area around eye	3 severe
		Swelling with lids half-closed to completely closed	4 severe		

IRIS

<i>Values</i>	<i>Rating</i>
Normal	0 none
Folds above normal, congestion, swelling, circumcorneal injection, iris reacts to light	1 slight
No reaction to light, haemorrhage, gross destruction	2 severe

Draize, J. H., Woodward, G., Calvery, H. O. (1944) Methods for the Study of Irritation and Toxicity of Substances Applied Topically to the Skin and Mucous Membranes, *J. Pharmacol. Exp. Ther.* 82: 377-390.

Draize J. H. (1959) Appraisal of the Safety of Chemicals in Foods, Drugs and Cosmetics. *Association of Food and Drug Officials of the US*, 49: 2-56.