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January 2001

**NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION  
AND ASSESSMENT SCHEME**

**FULL PUBLIC REPORT**

**Polymer in Adcote 503H**

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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Director  
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**FULL PUBLIC REPORT****Polymer in Adcote 503H****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 have submitted a notification statement in support of their application for an assessment certificate for the synthetic polymer of low concern (PLC) "Polymer in Adcote 503H".

**2. IDENTITY OF THE CHEMICAL**

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

**Marketing name:** Adcote 503H (45% w/w notified polymer).

**3. POLYMER COMPOSITION AND PURITY**

**Purity (%):** >99%

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

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

**Additives/adjuvants:**

Chemical name	CAS no.	% weight
Methyl ethyl ketone	78-93-3	40-50

**4. PLC JUSTIFICATION**

The notified polymer meets the PLC criteria.

**5. PHYSICAL AND CHEMICAL PROPERTIES**

The notified polymer is imported as a 45% solution in methyl ethyl ketone. The properties reported below are variously those of the polymer solution and of the notified polymer, as stated.

Property	Result	Comments
<b>Appearance</b>	Olive drab coloured solution (polymer solution).	
<b>Glass transition temperature (Tg)</b>	-5°C	
<b>Density</b>	0.972 (polymer solution).	Imported in solution.
<b>Water solubility</b>	Not determined.	The water solubility is too low to be measured.
<b>Particle size</b>	Not determined.	Imported in solution.
<b>Flammability</b>	Not determined.	
<b>Autoignition temperature</b>	Not determined.	
<b>Flash point:</b>	-6.1° C (polymer solution).	
<b>Explosive properties</b>	None.	
<b>Stability/reactivity</b>	Stable under normal conditions of use.	

### 5.1 Comments on physical and chemical properties

Tests were performed according to EEC/OECD test guidelines at facilities complying with OECD Principles of Good Laboratory Practice. The data provided is acceptable for a synthetic polymer of low concern.

Water solubility could not be measured. The notifier expects the polymer to be of low solubility by analogy to a structurally similar polymer (PLC/204), with number average molecular weight of 1 700 g/mol and water solubility of 71 mg/L. The notified polymer is expected to have a water solubility of considerably less than 71 mg/L because it has (a) higher number average molecular weight; (b) lower proportion of low molecular weight species; and (c) lower level of hydroxyl groups. Therefore, the water solubility of the notified polymer is expected to be low.

The polymer contains ester linkages that could be expected to undergo hydrolysis under extreme pH. The typical acidity of any terminal carboxylic acid functionalities would not sufficiently lower the pH of the solution to induce hydrolysis. Thus, hydrolysis is unlikely in the environmental pH range of between 4 and 9.

The notified polymer contains only reactive functional groups of low concern. It is expected to remain stable under ambient conditions.

Adcote 503H is classified as a class 3 Dangerous Goods in accordance with the ADG Code.

## 6. USE, VOLUME AND FORMULATION

### Use:

The notified polymer is a component of a laminating adhesive used in snack food packaging and other general packaging.

### Manufacture/Import volume:

The notified polymer will be imported as a component of Adcote 503H. The estimated quantity of the notified polymer in Adcote 503H to be imported is approximately 7 tonnes in the first year increasing to 20 tonnes per annum after 5 years.

### Formulation details:

The notified polymer will not be manufactured in Australia. It will be imported as a component (45%, w/w) in Adcote 503H polymer solution. Adcote 503H is packed in 200 L steel drums when imported.

## 7. OCCUPATIONAL EXPOSURE

Exposure route	Exposure details	Controls indicated by notifier
<b><i>Laminating machine operators</i></b>		
<i>Blending adhesive &amp; operating laminating machine (2-4 workers)</i>		
Dermal and ocular.	Adcote 503H (45% notified polymer) and the blended laminating adhesive (approximately 40% notified polymer), 6-8 hours/day, 50 days/year.	Blending vessels are situated in a bunded area with local exhaust ventilation.
	Adcote 503H is decanted from drums by gravity feed and blended mechanically with a second component in a mixing vessel.	Laminating machine is either fitted with exhaust ventilation ducts above the adhesive tray or in a wall or ceiling adjacent to the machinery.
	Pumping and application of adhesive mixture is a mechanical process.	Workers wear safety glasses, impervious gloves, overalls and safety boots when handling adhesives.
	Unused adhesive in the laminating machine tray or reservoir is manually transferred to a waste adhesive and solvent drum. Residues on the laminating machinery is wiped off manually using rags and ethyl acetate.	

The notifier did not provide the packaging details of the laminated aluminium films.

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**Packaging**

Dermal	Workers at the packaging factories will pack snack food and other items with the material containing the notified polymer. They will handle the laminated material and packed snack food where the notified polymer is unavailable for absorption.	Not specified.
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**Transport and storage**

*5 waterside workers, 5-10 transport & warehouse workers*

Dermal	Workers will handle Adcote 503H containing 45% notified polymer. Exposure to the 45% resin solution is only possible in the event of a spill.  Distribution packed snack food where the notified polymer is unavailable for absorption.	Not specified.
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**Disposal**

Dermal	Empty drums containing residue of the notified polymer solution are re-used at the same site for waste cleaning solvent and adhesive. The drums of waste solvent are disposed of to a licensed hazardous waste contractor.	Not specified.
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## **8. PUBLIC EXPOSURE**

The notified polymer is not available for sale to the general public and will be used as an ingredient in laminating adhesive products for use in food and other packaging applications. The potential for public exposure to the notified polymer during transport, reformulation or disposal is assessed as negligible. Although members of the public will consume food contained in laminated packaging manufactured using the notified polymer, the notifier has stated that the notified polymer is unavailable since it is sandwiched between two impervious layers. Exposure is therefore unlikely.

## **9. ENVIRONMENTAL EXPOSURE**

### **9.1. Release**

During formulation the notifier estimates that up to 148 kg per annum of notified polymer

waste will be generated. This will be derived from:

Spills:	4–8 kg/annum
Residues in the import containers:	40 kg/annum.
Equipment cleaning:	20 kg/annum
Unused blend:	80 kg/annum

Any unused blended adhesive on the blending equipment, adhesive trays and laminating machinery is manually transferred to a waste adhesive and solvent drum or wiped up using rags and ethyl acetate. The polymer waste from the above processes will be disposed to landfill by licensed hazardous waste contractors.

The remainder of the notified polymer, some 6.8-19.8 tonnes/annum, will be incorporated into snack food and other packaging.

## **9.2. Fate**

The notified polymer, either spilt or wasted during the formulation process, will be disposed to landfill by licensed hazardous waste contractors in the 200 L steel importation drums. Any notified polymer leaking from the drums is expected to become associated with the soil matrix and not to leach into the aquatic environment.

The majority of the notified polymer will ultimately make its way into domestic landfill as household garbage. Upon eventual degradation of the packaging films the notifier expects the adhesive incorporating the polymer to become part of the soil matrix and not leach into the aquatic environment because of the polymer's high molecular weight and hydrophobicity.

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

## **10. EVALUATION OF HEALTH EFFECTS DATA**

No toxicological data for the notified polymer were provided.

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

Chemical	Health hazards	Regulatory controls
<b>Constituents</b>		
Ethylene glycol	Harmful if swallowed (NOHSC, 1999a).	Exposure standard 60 mg/m <sup>3</sup> TWA, 120 mg/m <sup>3</sup> STEL (NOHSC, 1995).
The identity of another residual monomer has been exempted from publication in the Full Public Report.	It is present at below the cut-off for classification of the notified polymer as hazardous.	
<b>Hazardous impurities</b>		
None.		
<b>Additives/adjuvants</b>		
Methyl ethyl ketone	Highly flammable. Irritating to eyes and respiratory system (NOHSC, 1999a)	Exposure standard 150 ppm or 445 mg/m <sup>3</sup> TWA, 300 ppm or 890 mg/m <sup>3</sup> STEL (NOHSC, 1995)

## 11. EVALUATION OF ENVIRONMENTAL EFFECTS DATA

No ecotoxicological data were provided.

## 12. ENVIRONMENTAL RISK ASSESSMENT

Minimal release to the aquatic environment is expected during the use of the notified polymer in the formulation of the laminated adhesive. Small quantities of the notified polymer, derived from either spills or residue waste, will ultimately be released to landfill. In the event of a leak in landfill, the polymer is unlikely to be mobile in the soil environment and would be expected to slowly degrade to carbon dioxide gas through abiotic and biotic processes. The environmental hazard of the notified polymer in landfill is expected be low. If incinerated, the polymer would be rapidly destroyed and converted to water vapour and oxides of carbon.

Minimal release to the aquatic environment is expected through the disposal of packaging to domestic landfill. As the packaging gradually degrades the resulting end polymer is likely to become part of the soil matrix and not leach.

In the event of accidental release of the notified polymer into soils or waterways, the correct procedures as identified in the material safety data sheet (MSDS) should be followed.

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

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



## **13. HEALTH AND SAFETY RISK ASSESSMENT**

### **13.1. Hazard assessment**

The notified polymer in Adcote 503H is considered stable under normal conditions of use. However, the notifier indicated that the dry form of the notified polymer can burn. No toxicological information has been provided for the notified polymer and therefore the substance cannot be assessed against the NOHSC *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 1999b). Since the notified polymer has high NAMW, absorption across biological membranes would be limited.

The product Adcote 503H is a hazardous substance because of the high concentration of the solvent, methyl ethyl ketone (CAS 78-93-3). The MSDS for Adcote 503H lists a number of potential health effects, namely headaches, dizziness, nausea, vomiting, skin, eye and respiratory irritation, and chronic nervous system disorders. These relate mainly to the solvent, rather than the notified polymer.

### **13.2. Occupational health and safety**

There is little potential for significant health risk to the notified polymer in the transport and storage of the product containing this polymer. However, Adcote 503H is classified as Dangerous Goods in accordance with the ADG Code.

Potential exposure to the polymer in Adcote 503H may occur during the blending and transfer of adhesives, and when cleaning equipment. Exposure to the notified polymer via inhalation is expected to be minimal due to its low volatility. Exposure is most likely to be by skin contact. However, laminating machine operators are instructed to wear safety glasses, impervious gloves, coveralls and safety boots when handling Adcote 503H and blended adhesives. In addition, 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. The adverse health risk due to the notified polymer to these workers is considered to be low.

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.

Polymer in Adcote 503H is of low concern to human health and safety and no specific risk reduction measures are necessary.

The notified polymer has been used commercially in other countries for a number of years. No adverse health effects arising from human exposure to the notified polymer have been observed or reported.

### **13.3. 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 food and other packaging applications. 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 the notified polymer is sandwiched between two impermeable layers and is unlikely to be bioavailable.

## **14. MSDS AND LABEL ASSESSMENT**

### **14.1. MSDS**

The MSDS of Adcote 503H containing the notified 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). 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 Adcote 503H containing the 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**

To minimise occupational exposure to the Polymer in Adcote 503H, 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;
- 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 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;
- (ii) the notified polymer is introduced in a chemical form that does not meet the PLC criteria.

If any importer or manufacturer of the notified polymer becomes aware of any of these circumstances, they must notify the Director within 28 days.

## 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.

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

Standards Australia/Standards New Zealand (1994b) 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 (1994c) 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.