

File No: NA/247

Date: 29 May 1995

**NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION
AND ASSESSMENT SCHEME**

FULL PUBLIC REPORT

ACR-1720A 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.

For the purposes of subsection 78(1) of the Act, copies of this full public report may be inspected by the public at the Library, Worksafe Australia, 92-94 Parramatta Road, Camperdown NSW 2050, between the hours of 10.00 a.m. and 12.00 noon and 2.00 p.m. and 4.00 p.m. each week day except on public holidays.

For Enquiries please contact the Administration Coordinator at:

Street Address: 92 Parramatta Rd Camperdown, NSW 2050, AUSTRALIA
Postal Address: GPO Box 58, Sydney 2001, AUSTRALIA
Telephone: (61) (02) 565-9466 **FAX (61) (02) 565-9465**

Director
Chemicals Notification and Assessment

FULL PUBLIC REPORT**ACR-1720A POLYMER****1. APPLICANT**

Courtaulds (Australia) Pty Ltd of 51 McIntyre Rd, Sunshine, Vic 3020 has submitted a limited notification for assessment of ACR-1720A Polymer.

2. IDENTITY OF THE CHEMICAL

ACR-1720A 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, and specific end use have been exempted from publication in the Full Public Report and the Summary Report

Other name: ACR-1720A polymer

Trade name: As the polymer will not be marketed but will only be used as an intermediate in the manufacture of industrial coatings, no trade name has been assigned to it.

Number-average molecular weight: 13092

Weight-average molecular weight: 39325

Maximum percentage of low molecular weight species (molecular weight < 1000): 0.1%

Method of detection and determination:

Infrared spectroscopy; nuclear magnetic resonance spectroscopy; pyrolysis GC/MS and gel permeation chromatography

3. PHYSICAL AND CHEMICAL PROPERTIES

The polymer will be imported as a 30-60% (w/w) solution in 1-methoxy-2-propanol and 1-ethoxy-2-propanol. The solvents are 95% removed by vacuum distillation prior to formulation of the polymer into an aqueous emulsion. The polymer itself is never isolated. As a result there is limited information regarding the polymer's physico-chemical properties.

Appearance at 20°C and 101.3 kPa: viscous, clear light yellow to amber liquid (solvent solution)

Odour: the solvent solution has a odour characteristic of the solvent and residual monomers

Melting Point/Boiling Point:	the polymer softens and flows over a wide temperature range and is known to decompose before boiling
Density:	1180 kg/m ³ at 25°C (ACR-1720A Polymer)
Vapour Pressure:	polymer itself is a solid
Water Solubility:	predicted to be insoluble on the basis of composition and structure
Flash Point:	not applicable
Flammability Limits:	not flammable
Decomposition Temperature:	above about 300°C the polymer will begin to thermally degrade possibly yielding acid vapours
Reactivity/Stability:	under normal ambient conditions, the polymer and products containing it are considered to be stable. ACR-1720A, the solvent-containing polymer solution is acidic and will react with alkalis and metals. The water-containing intermediate formulations and paint formulations will react with strong alkalis, strong mineral acids and oxidising agents.

Comments on Physico-Chemical Properties

As the backbone and many of the side chains of the polymer are hydrophobic, high water insolubility is expected.

Hydrolysis details cannot be provided due to the low solubility of the polymer. The polymer contains a number of ester groups which are not expected to hydrolyse under environmental conditions.

Partition coefficient could not be measured due to the low water solubility of the polymer.

Adsorption desorption has not been measured but due to the high molecular weight the mobility of the polymer is expected to be low.

The polymer contains a small amount of carboxylic acid groups expected to have typical acidity.

4. PURITY OF THE CHEMICAL

Degree of purity: > 99%

Toxic impurities: all toxic impurities are at levels < 0.5% and are, therefore, not expected to render the polymer hazardous

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

Maximum content of residual monomers: 0.99%

Additives/Adjuvants: none remaining in the notified polymer

The imported formulation contains the following solvents:

- . **Chemical name:** propylene glycol, monomethyl ether
Synonym: 1-methoxy-2-propanol
CAS No.: 107-98-2
Weight percentage: 30-60%
- . **Chemical name:** propylene glycol, monoethyl ether
Synonym: 1-ethoxy-2-propanol
CAS No.: 1569-02-4
Weight percentage: 10-30%

Following distillation and mixing with water to produce an intermediate to be used as a component in finished coating products, the following additives are present in addition to the notified polymer:

- . **Chemical name:** water
CAS No.: 7732-18-5
Weight percentage: >60%
- . **Chemical name:** propylene glycol, monoethyl ether
Synonym: 1-ethoxy-2-propanol
CAS No.: 1569-02-4
Weight percentage: 2-10%

5. INDUSTRIAL USE

The notified polymer is to be used as a film-forming polymer for industrial coatings.

6. OCCUPATIONAL EXPOSURE

The notified polymer will be imported in 200 L drums as a 30-60% (w/w) solvent solution at a rate of 1-10 tonnes in the first year rising to 10 tonnes per year by the fifth year.

The imported polymer solution is charged to a closed reactor vessel via a pipeline under vacuum. Distillation at 100°C under vacuum removes 95% of the solvent following which the polymer formulation is neutralised by mixing in a neutralising agent. Water is added as a diluent to produce an intermediate polymer formulation which is used to formulate final coating products. The intermediate formulation contains < 25% of the notified polymer and is transferred from the reactor to 200 L drums for storage. The reactor vessel is cleaned with solvent which is then transferred to a solvent recovery unit for cleaning and recycling.

When required the water-based intermediate formulation is charged to an enclosed reactor vessel for formulation into a water-based paint. The final concentration of the notified polymer in the paint is < 10% (w/w). Following mixing, the paint is filtered during transfer to 200 L drums prior to transport to the user's site at which the paint is pumped

into an enclosed temperature-controlled vessel. Application of the paint is accomplished using a self-contained extracted spray booth. Likely levels of exposure are displayed in table 1.

Table 1 Worker exposure to ACR-1720A Polymer during formulation and use

Workers (number and category)	Nature of Work	Exposure (hrs/ day)	Exposure (days/yr)	Physical Form
REFORMULATION				
reactor operators (30 - max)	. charging . sampling . testing	4	2-5	. hot acrylic resin . ambient water-based intermediate
paint plant operators (30 - max)	. blending of paint . collection of QC samples	4	5-10	ambient water- based intermediate, paint formulations
maintenance personnel (2)	. breakdown . repair	1	2-3	ambient water- based intermediate
laboratory technicians/ chemists/ development personnel (20)	. testing of QC samples . trouble- shooting . product development	4	5-10	formulations containing the notified polymer
APPLICATION				
application/ curing operators (20 - max)	operation of paint application and curing process	system fully automated so little exposure anticipated	~210	paint formulations
Maintenance personnel (2)	repair and clean transfer lines, pumps, mixers etc.	1-2 (but variable), system automated	14 (system cleaned once per year)	paint formulations
laboratory technicians/ chemists (5)	testing of QC samples, trouble- shooting	~1	~210	paint formulations

7. PUBLIC EXPOSURE

The potential for public exposure to the notified polymer is expected to be low. The polymer will be a small component (< 10% w/w in the final paint product) of paint products which will be used only in industrial applications. Reformulation of the polymer is expected to take place at one industrial site and the final paint products are expected to be used at a single industrial site. Furthermore, heat curing cross-links the polymer into the paint film rendering it effectively inert.

In the case of accidental spillage during transport the public may be exposed to the notified polymer. This is minimised by the recommended practices for storage and transportation. Emergency procedures for the containment and clean up of accidental spills are available and should be followed.

8. ENVIRONMENTAL EXPOSURE

. Release

The notifier has identified several parts of the handling, formulation and application process where release to the environment could occur.

Releases to the environment will be limited to those that occur during formulation and when the paint containing the polymer is applied. Waste generated during formulation is sent to landfill or incinerated and is expected to be less than 20 kg per month. If a spill occurs during formulation it will be limited to an on-site sealed surface (in most cases bunded) and cleaned up according to the MSDS.

The polymer is expected to be used by only one manufacturer and applied in a spray booth. The spray booth is an extracted self-contained unit with a water curtain and uses recycled water. The water from the spray booth is treated by flocculation, which will remove most of the waste paint, with the 'clean' water returned to the spray booth. Solid residue from the flotation tanks, expected to be less than 250 kg per month (30% overspray), will be disposed of by landfill or incinerated.

The painted articles are baked to cure the polymer into a paint film. The cured polymer will be effectively inert and be disposed of with the articles. Releases of the cured polymer from the coated articles will be diffuse and limited to small quantities of the cured polymer.

During transport risk of environmental release is limited to accidents where the drums containing the polymer are ruptured.

. Fate

As ACR-1760A is a polymer with low water solubility, leaching from landfill sites is not expected. Incineration of the notified substance is expected to produce water and oxides of carbon and nitrogen.

The majority of the notified polymer is not expected to be released to the environment until it has been fully cured into a solid polymer matrix. The resultant matrix structure should limit the hydrolysis or biodegradation of the polymer. Bioaccumulation of the

polymer is unlikely due to the high molecular weight (~13 000) of the polymer even before curing.

9. EVALUATION OF TOXICOLOGICAL DATA

Toxicological data are not required for polymers of number-average molecular weight (NAMW) > 1000 according to the *Industrial Chemicals (Notification and Assessment) Act, 1989* and no data were submitted for the notified polymer.

10. ASSESSMENT OF ENVIRONMENTAL EFFECTS

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

11. ASSESSMENT OF ENVIRONMENTAL HAZARD

The polymer is unlikely to present a hazard to the environment at any stage of its use or disposal. Of the original quantity of polymer emulsion imported it is expected that most will not be released from the processing/application sites until it has been cured onto the article. The ultimate fate of all cured polymer is not known but most likely the majority will be disposed of by landfill. Leaching of the cured polymer from landfill is not expected due to the chemical and physical bonding which occurs during the surface coating process. Any cured polymer that may be removed from the coated articles will be inert and diffused over a wide area.

Any uncured polymer waste generated during formulation/application will be disposed of by landfill or incineration and is expected to be a maximum of 270 kg per month. This uncured polymer is not expected to pose an environmental hazard.

12. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY EFFECTS

The notified polymer has a NAMW > 1000 and therefore is unlikely to be able to cross biological membranes and cause adverse effects on health. The low levels of low molecular weight species (0.1%) and residual monomers (0.99%) are unlikely to render the polymer hazardous (2).

Worker exposure during paint formulation and application is minimised by isolation of the processes in fixed areas of the manufacturer's and applicator's sites. Various processes employed in paint manufacture are conducted under local exhaust ventilation such as reaction vessel charging, sampling, laboratory testing and drum filling. In addition, transfers to and from the reaction vessel are conducted using enclosed lines so that exposure to the notified polymer is expected to be low. Furthermore, workers are expected to be exposed for a maximum of 4 hours per day, 10 days per year. During paint application, exposure is also expected to be low since the process is fully automated and enclosed and the concentration of polymer in the paint is < 10%.

Since the notified polymer should not present a health hazard under normal conditions and exposure is expected to be low, the risk of adverse occupational and public health effects during transport, storage, reformulation and application is expected to be minimal.

13. RECOMMENDATIONS

To minimise occupational exposure to ACR-1720A 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) (3,4) and impermeable gloves (AS 2161) (5) should be worn. Overalls and protective footwear also should be worn;
- . spills and waste should be collected and disposed of in accordance with Local and State Government regulations and with the recommendations outlined in the Material Safety Data Sheets (MSDS);
- . good personal hygiene should be practised; and
- . copies of the MSDS should be easily accessible to employees.

14. MATERIAL SAFETY DATA SHEET

The MSDS for ACR-1720A and the aqueous formulation intermediate ACR-1720 were provided in Worksafe Australia format (6).

These MSDS were provided by Courtaulds (Australia) Pty Ltd as part of their notification statement. They are reproduced here as a matter of public record. The accuracy of this information remains the responsibility of Courtaulds (Australia) Pty Ltd.

15. REQUIREMENTS FOR SECONDARY NOTIFICATION

Under the *Industrial Chemicals (Notification and Assessment) Act 1989*, secondary notification of ACR-1720A 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. Sax N. I. and Lewis R. J., 1989, 'Dangerous Properties of Industrial Materials', Van Nostrand Reinhold, New York.
2. National Occupational Health and Safety Commission 1994 'Approved Criteria for Classifying Hazardous Substances', [NOHSC:1008(1994)], AGPS, Canberra.
3. Standards Australia 1982, 'Australian Standard 1336-1982 Eye protection in the Industrial Environment', Standards Association of Australia Publ., Sydney.
4. Standards Australia 1984, 'Australian Standard 1337 - 1984 Eye Protectors for Industrial Applications', Standards Association of Australia Publ., Sydney.
5. Standards Australia 1978, 'Australian Standard 2161-1978 Industrial Safety Gloves and Mittens (excluding Electrical and Medical Gloves)', Standards Association of Australia Publ., Sydney.
6. National Occupational Health and Safety Commission, 1990. , 'Guidance Note for the Completion of a Material Safety Data Sheet', 2nd. edition, AGPS, Canberra, Australia.¹

¹ This Guidance Note, to which an MSDS must conform in accordance with the *Act*, has been superseded by Worksafe Australia's National Code of Practice for the Preparation of Material Safety Data Sheets (March 1994) published by the Australian Government Publishing Service.