

File No: NA/196

Date: 11 November, 1999

**NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION
AND ASSESSMENT SCHEME**

FULL PUBLIC REPORT

ACR-1760A 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-1760A POLYMER****1. APPLICANT**

Courtaulds (Australia) Pty Ltd, 51 McIntyre Rd, Sunshine VIC 3020

2. IDENTITY OF THE CHEMICAL

Based on the nature of the chemical and the data provided, ACR-1760A polymer is considered to be non-hazardous. Therefore, details regarding the chemical identity, composition, specific use, import volume, identity of sites, process description and degradation products have been exempted from publication in the Full Public Report and the Summary Report.

Other names: Acryl styrene random copolymer
Acrylic resin solution (when formulated with solvent)

Trade names: ACR-1760A polymer

Method of detection and determination: Infra-red and nuclear magnetic resonance spectroscopy, pyrolysis GC/MS and gel permeation chromatography (GPC).

3. PHYSICAL AND CHEMICAL PROPERTIES

The following properties generally pertain to the ACR-1760A polymer formulated in solvent.

Appearance at 20°C and 101.3 kPa: Very viscous clear light yellow to amber liquid.
Appearance of the polymer itself is unknown.

Odour: Characteristic of the solvent present.

Melting Point/Boiling Point: Not determined. Decomposes prior to boiling, and softens and flows over a wide temperature range.

Specific Gravity/Density: 1140 kg/m³ at 25°C

Vapour Pressure: Not determined. As the polymer is a high molecular weight solid it is unlikely to have a significant vapour pressure.

Water Solubility: Not determined.

Fat Solubility: Not determined

Partition Co-efficient (n-octanol/water) log P_{o/w}: Not relevant due to low water solubility.

Hydrolysis as a function of pH: Not relevant due to low water solubility.

Adsorption/Desorption: Not determined.

Dissociation Constant:	Not determined.
Flammability Limits:	Polymer not flammable.
Pyrolysis Products:	Ingredient monomers and miscellaneous hydrocarbons.
Decomposition Temperature:	Heating may result in the release of vapours containing acrylic monomers.
Decomposition Products:	After the heat curing cross-linking occurs which is expected to prevent any further depolymerisation.
Autoignition Temperature:	Unknown.
Reactivity/Stability:	Expected to be stable under ambient conditions, but may thermally decompose at possibly yielding acrid vapours.
Particle size distribution:	Not relevant as the polymer will be imported as a component in solvents and will not be isolated as a solid at any stage during its use.

Comments on physico-chemical properties

Water Solubility: Water solubility data were not provided. By analogy with similar polymers, it is not expected to be soluble in water as water insolubility is a functional requirement. However, the polymer emulsion is fully miscible with water.

Hydrolysis: Hydrolysis is not expected under environmental conditions due to low water solubility.

Adsorption/desorption: Adsorption/desorption data were not provided. Upon drying ACR-1760A polymer polymerises to form an insoluble clear solid that would immobilise it.

Dissociation constant: There are readily dissociable groups in the polymer. ACR-1760A polymer is expected to have acidic properties. However, due to the high molecular weight and expected low water solubility the dissociation constant would be difficult to measure.

4. INDUSTRIAL USE

ACR-1760A polymer will make up a proportion of a paint product used in a manufacturing industry. The notified polymer will be imported as a component of the acrylic resin solution known simply as ACR-1760A. It does not exist in pure form and is never isolated as such. ACR-1760A polymer has been manufactured and used overseas for two years and no adverse effects have been reported.

5. OCCUPATIONAL EXPOSURE

ACR-1760A polymer will be transported by ship into Australia in 200L drums and then transported by road to the Courtaulds site, generally in load sizes of 2 tonnes. It will be transported and stored as a dangerous good as a result of the solvents that make up the formulation. Transport and storage workers are unlikely to be exposed to ACR-1760A polymer except in the case of accidental spillage. Exposure to ACR-1760A polymer may occur to a maximum of 102 personnel involved in reformulation processes at the Courtaulds site and a further 27 involved in application procedures at a customers premises.

ACR-1760A is reformulated into an intermediate product and then transferred to 200 L drums and stored until required when it is blended into paint formulations. Reformulation occurs in closed system

vessels in fixed areas thus limiting exposure to the notified chemical. Vessel charging, sampling, laboratory testing and drum filling are all performed under local exhaust ventilation. The reactor vessel is cleaned with a solvent which is then recycled. The paint is subsequently supplied to a customer. Application of the paint is carried out in an automatic self contained spray booth utilising exhaust extraction.

It is expected that the following staff will be exposed to ACR-1760A polymer in the course of their normal work.

Reformulation Process

Worker Description	Nature of Work	Exposure hrs/day	Exposure days/year	Physical form
40 Reactor operators	-charging -sampling -testing	4	5-10	-hot acrylic resin formulation and ambient water based intermediate
40 Paint plant operators	-paint blending -collection of QC samples	4	10-20	ambient water based intermediate & paint formulations
2 Maintenance personnel	breakdown repair	1	5	ambient water based intermediate
20 Lab workers & development personnel	sample testing trouble shooting product development	4	10-20	formulations containing ACR-1760A polymer

Application Process

20 Application/curing operators	Operate application and curing process	Fully automatic-negligible	210	Formulations containing ACR-1760A polymer
2 Maintenance personnel	Repair/clean transfer lines, pumps, mixers	1-2 (variable), automated	14 (system cleaned once/year)	Formulations containing ACR-1760A polymer
5 Laboratory workers	Sample testing and troubleshooting	1	210	Formulations containing ACR-1760A polymer

6. PUBLIC EXPOSURE

There is low potential for public exposure to ACR-1760A polymer during shipment and transportation or disposal procedures. The public should not come into contact with the notified polymer during formulation or application procedures. Once applied, the polymer crosslinks and forms a hard film when it is heat cured. These facts suggest that there will be low potential for public exposure and therefore minimal public health effects.

7. ENVIRONMENTAL EXPOSURE

. Release

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 banded) and cleaned up according to the MSDS sheets.

The polymer is expected to be used and applied in a spray booth. The spray booth is a down draft 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 during product repairs etc. 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 of the polymer even before curing.

8. EVALUATION OF TOXICOLOGICAL DATA

No toxicity data were provided which is acceptable under the *Act* for a polymer with a number average molecular weight >1000.

9. ASSESSMENT OF ENVIRONMENTAL EFFECTS

No aquatic toxicity data were provided, but none are required according to the *Act*, since the notified polymer has a number average molecular weight (NAMW) > 1000.

Due to its high NAMW the polymer is not expected to cross biological membranes.

10. 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. 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 is released, 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 be an environmental hazard.

11. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY EFFECTS

The notified chemical is a high molecular weight polymer with a number-average molecular weight of > 1000 and is therefore unlikely to cross biological membranes. The formulation containing the notified polymer is a very viscous clear light yellow to amber liquid. The polymer's vapour pressure is expected to be low due to its high molecular weight. ACR-1760A polymer is therefore unlikely to be either easily spilled or inhaled, and is expected to present a low health hazard.

Work practices designed to reduce the risk of exposure to other volatile and hazardous paint ingredients, in particular solvents, would be adequate to minimise exposure to the notified polymer. Exposure during reformulation is reduced by using closed system vessels and local exhaust ventilation. During paint application automatic spray equipment is used inside spray booths utilising exhaust extraction. Exposure to ACR-1760A polymer is thus limited by the use of engineering techniques.

There is some potential for public contact with ACR-1760A on the final manufactured article. However, the notified polymer will be present as a cross linked hard film and this combined with its relatively inert properties suggest that the public health effects arising from such exposure should be minimal. ACR-1760A polymer appears to present a low occupational risk as a result of its low hazard and the engineering controls utilised.

12. RECOMMENDATIONS

To minimise occupational exposure to ACR-1760A polymer the following guidelines and precautions should be observed:

- . If engineering controls and work practices are insufficient to significantly reduce exposure to a safe level, then personal protective devices which conform to and are used in accordance with Australian Standards (AS) for chemical-type goggles (AS 1336; AS 1337) (1,2), impermeable gloves (AS 2161) (3) and protective overalls should be worn.
- . Good work practices should be implemented to avoid splashing or spillages.
- . Good personal hygiene should be adopted.
- . A copy of the MSDS for ACR-1760A polymer or products containing it should be easily accessible to employees.

13. MATERIAL SAFETY DATA SHEET

The Material Safety Data Sheet (MSDS) for ACR-1760A polymer formulation was provided in Worksafe Australia format (4). (Attachment 1). This MSDS was provided by Courtaulds (Australia) Pty Ltd as part of their notification statement. It is reproduced here as a matter of public record. The accuracy of this information remains the responsibility of Courtaulds (Australia) Pty Ltd.

14. REQUIREMENTS FOR SECONDARY NOTIFICATION

Under the *Industrial Chemicals (Notification and Assessment) Act 1989* (the Act), secondary notification of ACR-1760A polymer shall be required if any of the circumstances stipulated under subsection 64(2) of the Act arise. No other specific conditions are prescribed.

15. REFERENCES

1. Australian Standard 1336-1982, *Eye protection in the Industrial Environment*, Standard Association of Australia Publ; Sydney, 1982.
2. Australian Standard 1337-1984, *Eye protectors for Industrial Applications*, Standard Association of Australia Publ; Sydney, 1984.
3. Australian Standard 2161-1978, *Industrial Safety Gloves and Mittens (excluding Electrical and Medical Gloves)*, Standard Association of Australia Publ., Sydney, 1978.
4. Worksafe Australia, March 1994, *National Code of Practice for the Preparation of Material Safety Data Sheets* [NOHSC:2011(1994)], Australian Government Publishing Service, Canberra.