

File No: NA/173

Date: 2 August 1994

**NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION
AND ASSESSMENT SCHEME**

FULL PUBLIC REPORT

UREA, POLYMER WITH ETHANEDIAL, FORMALDEHYDE AND PROPANAL

This Assessment has been compiled in accordance with the provisions of the *Industrial Chemicals (Notification and Assessment) Act 1989, as amended* 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 Health, Housing, Local Government and Community Services.

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.

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Director
Chemicals Notification and Assessment

FULL PUBLIC REPORT

UREA, POLYMER WITH ETHANEDIAL, FORMALDEHYDE AND PROPANAL

1. APPLICANT(S)

Fidene Corporation Pty Ltd, 52 Frenchs Road, Willoughby, NSW 2068.

2. IDENTITY OF THE CHEMICAL

Chemical name: Urea, polymer with ethanedial, formaldehyde and propanal

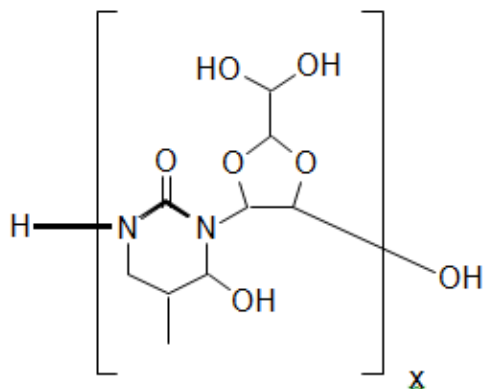
Chemical Abstracts Service (CAS) Registry No.: 106569-82-8

Other name: Pyrimidone - glyoxal resin

Trade name: SUNREZ 747

Molecular formula: $(C_9H_{14}O_6N_2)_x$

Structural formula:



$$x \leq 24$$

Molecular weight:

Number-average molecular weight: 3000 - 1000

**Maximum percentage of low
molecular weight species**

(molecular weight < 1000): Not quantified (estimated
to be < 10%)

Composition of ADX 221

Monomer(s) :

.	Chemical name:	Urea
	Weight percentage:	13.18%
.	Chemical name:	50% Formaldehyde
	Weight percentage:	13.18%
.	Chemical name:	Propionaldehyde
	Weight percentage:	12.75%
.	Chemical name:	Glyoxal
	Weight percentage:	60.88%

Method of detection and determination:

The polymer can be separated by gel permeation chromatography and identified by infrared spectroscopy.

Spectral data:

Infrared spectrum for SUNREZ 747 polymer: major absorption peaks at 950, 1150, 1300, 1500, 1650, 3000, 3600 cm⁻¹.

3. PHYSICAL AND CHEMICAL PROPERTIES

The notified polymer in the form of the product SUNREZ 747 will be imported in 55% water and 2.4% sodium sulphate. The physical and chemical properties listed below are based on this product.

Appearance at 20°C and 101.3 kPa: Amber coloured liquid

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Odour:	Mild caramel odour
Boiling point:	100°C
Density:	1180 kg/m ³
Vapour Pressure:	101 kPa
Water Solubility:	Completely soluble
Partition Co-efficient (n-octanol/water) log P_{o/w}:	Not determined
Hydrolysis as a function of pH:	Not determined
Adsorption/Desorption:	Not determined
Dissociation Constant pKa:	Not determined
Flash Point:	> 100°C
Flammability Limits:	Not determined
Combustion Products:	Not determined
Degradation products:	Glyoxal, sodium glycolate and cyclic urea (4-hydroxy- 5-methyl-2-pyrindene
Decomposition Temperature:	Not determined
Decomposition Products:	Oxides of carbon and nitrogen
Autoignition Temperature:	Not determined
Explosive Properties:	Not determined
Reactivity:	Stable at operating conditions, incompatible with strong acids and alkalies
Particle size distribution:	Not applicable

. **Comments on Physico-Chemical Properties**

No hydrolysis data is available but the notifier states that hydrolytic stability is a required function of the polymer as water is used as a solvent and storage medium. The polymer contains ketal functions which may be expected to hydrolyse in acidic solutions.

The partition coefficient was not determined as a polymer of this molecular size (NAMW >1000) is not expected to cross biological membranes. The high water solubility indicates that this should be low.

Adsorption of the polymer to soil is expected because when the water from the formulation is removed the residual polymer becomes tacky and acts as a binder. This process, however, is reversible.

Dissociation constant measurements were not provided the notified substance is soluble in water it is stored and transported as a solution in water. Examination of the structure indicates the polymer is unlikely to dissociate at pH levels normally encountered in the environment.

4. PURITY OF THE CHEMICAL

Degree of purity : >90%

Residual monomers and their concentrations:

. Chemical name:	Formaldehyde
CAS No:	50-00-0
Weight percentage:	0.002%
Toxic properties;	Exposure Standards (1)
	TWA - 1.2 mg/m ³
	STEL - 2.5 mg/m ³
	Oral rat LD ₅₀ =800 mg/kg (2)
	Suspected human carcinogen
	Human skin and eye irritant

Additives/Adjuvants: The product also contains the following:

5. INDUSTRIAL USE

The intended import volume is estimated to be approximately 4.5 tonnes per annum for the next five years.

The notified polymer is shipped and stored in 205 litre drums.

7. PUBLIC EXPOSURE

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minuscule. In addition, Sunrez 747 is approved by the United States Food and Drug Administration for use in paper and cardboard coatings in contact with dry food. These facts suggest there will be minimal public health effects.

8. ENVIRONMENTAL EXPOSURE

. Release

In the mixing station waste and spillage is collected by drains leading to the waste treatment plant.

After the application by flexographic roller process the paper drying oven fixes the polymer to the paper surface where it remains for the life of the article.

Approximately 6 kg of coating mix (containing ~ 30 gm of the notified substance) remains as mixing station spill and as ullage in the roller coating application tank at the end of a run. This coating mix is washed down in the machinery cleanup to the collection tanks of the waste water treatment plant (T Bevis pers comm).

The waste treatment process in the paper plant is licensed (by State and local authorities) only to release to the sewer water with a solids content of less than 1.5%. The operator of the waste treatment plant adds a polymer to each batch of waste water to cause flocculation and settling of suspended and dissolved solids. The notified substance is expected to bond strongly to the flocculating agent. Treated water is released to sewer. The collected solids are disposed of to landfill.

Paper is usually disposed of to landfill or recycled. In the recycling process the polymer would be re-solubilised in the pulping liquor and captured in the water treatment process of the plant where the flocculate and sludge are collected and consigned to landfill.

. Fate

The highest environmental exposure of the notified substance is likely to be to landfill where it is bound to the flocculation solids or to sludge and will remain immobile and not degrade. Small amounts may enter the aquatic compartment.

9. EVALUATION OF TOXICOLOGICAL DATA

No toxicology data have been provided for SUNREZ 747 which is acceptable under the Act for a chemical introduced with number average molecular weight (NAMW) >1000.

10. ASSESSMENT OF ENVIRONMENTAL EFFECTS

No ecotoxicological data is required for polymers of NAMW > 1000 according to the Act. However brief details of tests were submitted on a number of aquatic species.

. Fish

A 96 hour static toxicity test was carried out on Bluegill Sunfish *Lepomis macrochirus* for concentrations from 12.5-100 ppm of the polymer Sunrez-747. It was found that the polymer at the tested rates exhibits no toxic effects on the species tested.

. Daphnia

Daphnia were exposed to concentrations of the polymer ranging from 0.95-100 ppm in a 48 hour static toxicity test. No dose related response was obtained with a wide variation in survival across the exposure range.

. Algae

A test on the sensitive species *Selenastrum capricornutum* was conducted with nominal concentrations of the notified substance ranging from 1-1000 ppm, over a 96 hour period in a static water. No effect was seen on cell reproduction.

The three tests provided show that the notified substance is of low toxicity to aquatic species.

11. ASSESSMENT OF ENVIRONMENTAL HAZARD

The polymer is unlikely to present a hazard to the environment when it is transported, stored, mixed and applied to paper products in the manner described.

The polymer is also unlikely to be hazardous to aquatic organisms due to the end-use application and the polymer's high molecular weight.

In the factory adequate precautions are in place to prevent escape of spills. and waste treatment is provided before release to the sewer. The factory may release up to 1 megalitre of water per day (T Bevis pers comm) which as a maximum would contain the wash down water of 4 batches of coating mix containing 30 g each (120 g) of the notified substance. The concentration before treatment would be 0.1 ppm. This is well below toxic levels to aquatic organisms before adsorption to the flocculants, further dilution and possible degradation.

The concentration of the polymer on the finished paper is low (~ 0.1-0.2% w/w). It is strongly bound to the paper and other constituents of the coating mix and unlikely to be released under normal use conditions.

12. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY EFFECTS

There is no information on the effects of the notified polymer on human health. No toxicology data were submitted which is acceptable for polymers with NAMW >1000 and the polymer being of high molecular weight is unlikely to cross biological membranes and cause systemic effects.

Glyoxal which is a severe eye irritant is present with the polymer at a concentrations of 3.4%. But the mixture is not considered to be hazardous at this concentration (3).

The most likely routes of exposure are skin and eye contact during the use of the polymer. Under normal use conditions and correct handling procedures, the potential for occupational exposure to the notified polymer will be low and is not expected to pose a significant health and safety risk to humans.

There is potential for widespread public contact with Urea, Polymer with Ethanedial, Formaldehyde and Propanal on paper and cardboard products. However, the low amount of notified polymer present and its relatively inert properties mean that the public health exposure resulting from its use should be negligible.

13. RECOMMENDATIONS

To minimise occupational exposure to the notified polymer in SUNREZ 747 the following guide-lines and precautions should be observed:

- . if engineering controls and work practices are insufficient to reduce exposure to a safe level, the following personal protective equipment which comply with Australian Standards should be worn. Overalls (AS 3765.1-1990 (4), (AS 3765.2-1990 (5), during handling splash proof goggles (AS 1336-1982 (6), AS 1337-1984 (7)) and PVC gloves (AS 2161-1978) (8));
- . good work practices should be implemented to avoid spills;
- . clean up spills promptly; and
- . a copy of the Material Safety Data Sheet (MSDS) should be easily accessible to all employees.

14. MATERIAL SAFETY DATA SHEET

The Material Safety Data Sheet (MSDS) for SUNREZ 747 was provided in Worksafe Australia format (9). This MSDS was provided by Fidene Corporation 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 Fidene Corporation Pty Ltd.

15. REQUIREMENTS FOR SECONDARY NOTIFICATION

Under the *Industrial Chemicals (Notification and Assessment) Act 1989* (the Act), secondary notification of SUNREZ 747 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. National Occupational Health and Safety Commission, Exposure Standards for Atmospheric Contaminants in the Occupational Environment, 2nd Edition, Australian Government Publishing Service Publ., Canberra, 1991.
2. RTECHS Data Base - US Department of Health and Human Services (NIOSH), 1992.
3. Approved Criteria for Classifying Hazardous Substances {NOHSC:1008(1994)}
4. Australian Standard 3765.1-1990, "Clothing for Protection Against Hazardous Chemicals, Part 1: Protection Against General or Specific Chemicals", Standards Association of Australia Publ., Sydney, 1990.
5. Australian Standard 3765.2-1990, "Clothing for Protection Against Hazardous Chemicals, Part 2: Limited Protection Against Specific Chemicals", Standards Association of Australia Publ., Sydney, 1990.
6. Australian Standard 1336-1982, "Recommended Practices for Eye Protection in the Industrial Environment", Standards Association of Australia Publ., Sydney, 1982
7. Australian Standard 1337-1984, "Eye Protectors for Industrial Applications", Standards Association of Australia Publ., Sydney, 1990.
8. Australian Standard 2161-1978, "Industrial Safety Gloves and Mittens (excluding Electrical and Medical Gloves)", Standards Association of Australia Publ., Sydney, 1978.
9. National Occupational Health and Safety Commission, *Guidance Note for the Completion of a Material Safety Data Sheet*, 2nd. edition, AGPS, Canberra, 1990.