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**NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME
(NICNAS)**

FULL PUBLIC REPORT

2-Propenoic acid, 2-methyl, methyl ester, polymer with ethene

This Self Assessment has been compiled in accordance with the provisions of the *Industrial Chemicals (Notification and Assessment) Act 1989* (Cwlth) (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 Department of Health and Ageing, and conducts the risk assessment for public health and occupational health and safety. The assessment of environmental risk is conducted by the Department of the Environment and Heritage. The data supporting this assessment will be subject to audit by NICNAS.

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**Director
NICNAS**

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2-Propenoic acid, 2-methyl, methyl ester, polymer with ethene
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1. APPLICANT AND NOTIFICATION DETAILS

APPLICANT(S)

ITOCHU AUSTRALIA, 63 Exhibition Street, Melbourne, Victoria 3000, AUSTRALIA (ABN Number 63000192790).

NOTIFICATION CATEGORY

Self Assessment: Polymer of Low Concern

EXEMPT INFORMATION (SECTION 75 OF THE ACT)

No details are claimed exempt from publication.

VARIATION OF DATA REQUIREMENTS (SECTION 24 OF THE ACT)

No variation to the schedule of data requirements is claimed.

PREVIOUS NOTIFICATION IN AUSTRALIA BY APPLICANT(S)

None

NOTIFICATION IN OTHER COUNTRIES

Known to be notified in Canada and US - Polymer of Low Concern

Also known to have been notified in China, Japan, Korea, the Philippines

2. IDENTITY OF CHEMICAL

CHEMICAL NAME

2-Propenoic acid, 2-methyl, methyl ester, polymer with ethene

OTHER NAME(S)

ACRYFT, CM5021, CM5022, CM5023

MARKETING NAME(S)

ACRYFT, COSMOTHENE (The notified polymer will be marketed under both names)

CAS NUMBER

25101-13-7

MOLECULAR FORMULA

$(C_5H_8O_2.C_2H_4)_x$

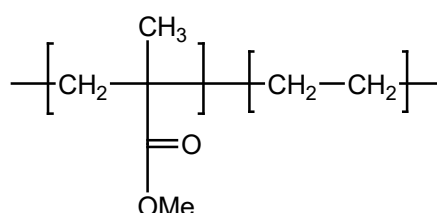
STRUCTURAL FORMULA

A Monomer sequence image of "Acryft"

E: ethylene ; MMA: methyl methacrylate ; H: hydrogen

HE-E-MMA-E-MMA-E-E-E-MMA-MMA-E-E-MMA-E-MMAEH

(Random copolymerization)



Chemical Structure of "Acryft"

MOLECULAR WEIGHT	The molecular weight has been measured on three different products with different MW ranges, CM5021, CM5022 and CM5023 (all of them are Acryft). Generally the measuring conditions are different in case of lower molecular weight (MW) and higher MW products. The lower MW products are measured at lower temperature with suitable solvent (tetrahydrofuran). The higher MW is measured at 150°C with o-dichlorobenzene. That's why two different temperatures are reported below:	
Number Average Molecular Weight (NAMW)	Measurement at 150°C	Measurement at 40°C
	CM5021 – 22040	CM5021 – 21870
	CM5022 – 20370	CM5022 – 19020
	CM5023 – 25300	CM5023 – 32330
Weight Average Molecular Weight (WAMW)	Measurement at 150°C	Measurement at 40°C
	CM5021 – 66220	CM5021 – 59500
	CM5022 – 62880	CM5022 – 54640
	CM5023 – 83070	CM5023 – 74720
Polydispersity Index (WAMW/NAMW)	Measurement at 150°C	Measurement at 40°C
	CM5021 – 3.0	CM5021 – 2.7
	CM5022 – 3.1	CM5022 – 2.9
	CM5023 – 3.3	CM5023 – 2.3
% of Low MW Species < 1000	CM5021 – 0.04%	
	CM5022 – 0.19%	
	CM5023 – 0.00%	
% of Low MW Species < 500	CM5021 – 0.00%	
	CM5022 – 0.00%	
	CM5023 – 0.00%	

3. COMPOSITION

POLYMER CONSTITUENTS

<i>Chemical Name</i>	<i>CAS No.</i>	<i>Weight % starting</i>	<i>Weight % residual</i>
2-Methyl-2-propenoic acid methyl ester	80-62-6	28-32	0
Ethene	74-85-1	68-72	0

PLC CRITERIA JUSTIFICATION

<i>Criterion</i>	<i>Criterion met (yes/no/not applicable)</i>
Molecular Weight Requirements	Yes
Functional Group Equivalent Weight (FGEW) Requirements	Yes
Low Charge Density	Yes
Approved Elements Only	Yes
Stable Under Normal Conditions of Use	Yes
Not Water Absorbing	Yes
Not a Hazard Substance or Dangerous Good	Yes

The notified polymer meets the PLC criteria

4. INTRODUCTION AND USE INFORMATION

MODE OF INTRODUCTION OF NOTIFIED CHEMICAL (100%) OVER NEXT 5 YEARS

The polymer will be imported into Australia. The polymer will be imported in the form of pellets which have a diameter of approx. 3mm.

MAXIMUM INTRODUCTION VOLUME OF NOTIFIED CHEMICAL (100%) OVER NEXT 5 YEARS

Year	1	2	3	4	5
Tonnes	150	1000	1500	2000	3000

USE

The polymer is an additive for use in adhesives, plastic film and sheeting, cable sheathing and packaging. It will be used in a wide range of products, ranging from use in adhesives to coverings for books, wallpapers, packaging materials and sheaths for wires and cables. It is also a hot melt adhesive additive, providing high temperature stability and low odour extrusion coating and surface protection for such products as steel, plastic board and silicone-wafers. As the polymer will be used in a wide range of products it is not possible to identify exactly the amount of polymer in each formulation.

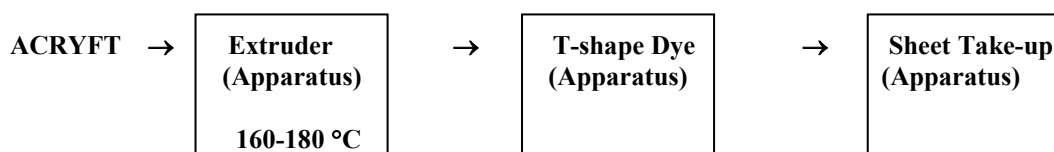
ACRYFT exhibits properties inherent to conventional ethylene vinyl acetate (EVA) polymers, such as flexibility, rubber-like elasticity, superior low temperature properties and low temperature heat seal, however features significantly improved thermals stability over EVA and does not, like EVA, form acid upon decomposition. Thus it is not corrosive and does not produce an irritant odour.

5. PROCESS AND RELEASE INFORMATION

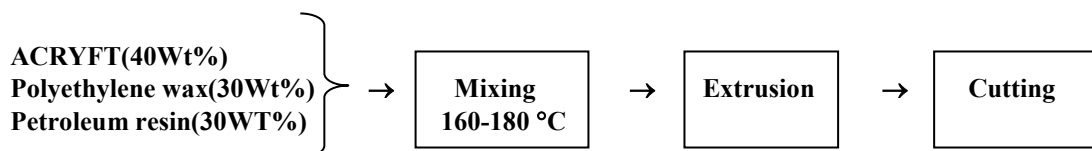
5.1. Operation Description

Processing will involve a heating/melting step, extrusion and shaping. Flow charts are given below. ACRYFT will be supplied to customers in a 25 kg polyethylene or paper bag. The polymer will be introduced manually or automatically to the extrusion apparatus. Extrusion will be carried out according to customers end-use product requirements.

1. Film/ Sheet production process



2. Hot melt adhesion production process



6. EXPOSURE INFORMATION

6.1. Summary of Occupational Exposure

Exact details of workplace exposure are not available. The factories using the polymer will be automated and operator exposure will be minimal. Inhalation and skin contact will be avoided by the use of impermeable protective gloves and dust masks. If required, dust-proof filling apparatus and appropriate ventilation will be used.

Although there are no exact details of workplace exposure, a literature search has been conducted for polymeric products which will be used in a similar fashion to ACRYFT (ie as pellets) and which will result in similar exposure levels. A study on polyethylene processing monitored airborne concentrations of 450 compounds during commercial-scale processing in applications such as extrusion coating, blow moulding and pipe extrusion. It was concluded that polyethylene extrusion presents minimal inhalation hazards in a modern ventilated environment. ("Quantitation of employee exposure to emission products generated by commercial-scale processing of polyethylene". Tikuisis T., et al. Am Ind Hyg Assoc J. 1995 56(8): 809-14)

6.2. Summary of Public Exposure

The public may be exposed to the polymer from the numerous household products in which it can be used. The polymer will not be absorbed by skin contact and will not react to produce any products of concern.

6.3. Summary of Environmental Exposure

6.3.1. Environmental Release

During manufacture of products containing the polymer there will be minimal release to the environment. All waste streams and spillages will be incinerated. The manufacture of the various products containing ACRYFT will only be conducted in industry by suitably trained personnel and there will be no intentional release of the substance. Normal safe operating procedures will be used to prevent exposure or discharge of any preparation. Potential environmental exposure is considered to be negligible

6.3.2. Environmental Fate

Products containing the polymer may be disposed of to landfill sites or may be incinerated. As these products can be used in the normal household environment, they could be disposed in household waste. The polymer contains a very low amount of low molecular weight species and will have a very low release rate to water.

7. PHYSICAL AND CHEMICAL PROPERTIES

Appearance at 20°C and 101.3 kPa	Clear to opaque pellets, approximately 3mm in diameter
Melting Point/Glass Transition Temp	CM5021 66.7°C / -27.4 °C CM5022 62.5°C / -28.2 °C CM5023 68.0°C / -25.9 °C
Density	(method : ASTM D3417) CM5021 940 kg/m ³ at 23 ±2°C CM5022 940 kg/m ³ at 23 ±2°C CM5023 940 kg/m ³ at 23 ±2°C
Water Solubility	(method : ASTM792) < 90 µ g/L at 20°C
Dissociation Constant	Acryft is a co-polymer prepared from 2-methyl-2-propenoic acid methyl ester (methyl methacrylate, CH ₃ C(=CH ₂)COOCH ₃) and ethene (ethylene, CH ₂ =CH ₂). The only functional groups present in the monomers are (1) the unsaturated olefins (which will be lost on polymerisation), and (2) the ester linkage (which are unaffected by polymerisation). Unsaturated hydrocarbons are not subject to ionisation, and ester groups are also considered stable and not subject to ionisation under normally-expected conditions. The final polymer may therefore reasonably be expected to exhibit the same characteristics.

If the compound is not normally ionised, then experimental evaluation of the dissociation constant is not required, and would not yield an applicable result. Any technique would, in any case, be required to accommodate the highly insoluble nature of the material in aqueous matrix. This in itself is a further indication of the lack of ionisation (which generally renders materials more soluble).

Particle Size

3mm diameter

Reactivity

ACRYFT will not degrade by oxidation, hydrolysis, by action of sunlight, or by microbial degradation

Degradation Products

None

8. HUMAN HEALTH IMPLICATIONS**8.1. Toxicology**

No toxicological data were submitted.

8.2. Human Health Hazard Assessment

The polymer will not be absorbed in contact with the skin and will not degrade/react under normal conditions of use, to produce any products of concern. The notified polymer meets the PLC criteria and can therefore be considered to be of low hazard.

9. ENVIRONMENTAL HAZARDS**9.1. Ecotoxicology**

No ecotoxicological data were submitted.

9.2. Environmental Hazard Assessment

The notified polymer meets the PLC criteria and can therefore be considered to be of low hazard.

10. RISK ASSESSMENT**10.1. Environment**

No unacceptable risk at the tonnage level proposed. The release of the polymer during formulation will be minimal. Release to the environment during normal end use will be via landfill or incineration.

10.2. Occupational Health and Safety

No unacceptable risk at the tonnage level proposed. Workplace exposure will be limited by use of PPE and appropriate ventilation. ACRYFT provides markedly improved thermal stability over conventional ethylene vinyl acetate copolymer and thus is likely to produce reduced levels of occupational exposure

10.3. Public Health

No unacceptable risk at the tonnage level proposed. The polymer will not be absorbed by skin or react to produce products of concern

11. CONCLUSIONS – ASSESSMENT LEVEL OF CONCERN FOR THE ENVIRONMENT AND HUMANS**11.1. Environmental Risk Assessment**

The polymer is not considered to pose a risk to the environment based on its reported use

pattern.

11.2. Human Health Risk Assessment

11.2.1. Occupational health and safety

There is no concern to occupational health and safety under the conditions of the occupational settings described.

11.2.2. Public health

There is negligible concern to public health when used in consumer products

12. MATERIAL SAFETY DATA SHEET

12.1. Material Safety Data Sheet

The notifier has provided MSDS as part of the notification statement. The accuracy of the information on the MSDS remains the responsibility of the applicant.

13. RECOMMENDATIONS

CONTROL MEASURES

Occupational Health and Safety

- No specific engineering controls, work practices or personal protective equipment are required for the safe use of the notified polymer itself, however, these should be selected on the basis of all ingredients in the formulation.

Guidance in selection of personal protective equipment can be obtained from Australian, Australian/New Zealand or other approved standards.

- A copy of the MSDS should be easily accessible to employees.

Disposal

- The notified polymer should be disposed of following local regulations. It may be disposed of by incineration.

Storage

- The following precautions should be taken by the formulator regarding storage of the notified polymer:
 - *Store in original container away from sources of heat and direct sunlight*

Emergency procedures

- Spills/release of the notified polymer should be swept up and disposed of as waste following local regulations.

13.1. Secondary Notification

The Director of Chemicals Notification and Assessment must be notified in writing within 28 days by the notifier, other importer or manufacturer:

- (1) Under subsection 64(1) of the Act; if
 - the notified polymer is introduced in a chemical form that does not meet the PLC criteria.

or

- (2) Under subsection 64(2) of the Act:

- if any of the circumstances listed in the subsection arise.

The Director will then decide whether secondary notification is required.