

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

POLYMER OF LOW CONCERN PUBLIC REPORT

1,4-Benzenedicarboxylic acid, polymer with 1,3-dihydro-1,3-dioxo-5-isobenzofurancarboxylic acid, hexanedioic acid, α,α' -[(1-methylethylidene)di-4,1-phenylene]bis[ω -hydroxypoly(oxy-1,2-ethandiyl)], α,α' -[(1-methylethylidene)di-4,1-phenylene]bis[ω -hydroxypoly[oxy(methyl-1,2-ethandiyl)]] and 1,2-propanediyl, benzoate.

This Assessment has been compiled in accordance with the provisions of the *Industrial Chemicals (Notification and Assessment) Act 1989* (the Act) and Regulations. The National Industrial Chemicals Notification and Assessment Scheme (NICNAS) is administered by the Australian Government Department of Health, and conducts the risk assessment for public health and occupational health and safety. The assessment of environmental risk is conducted by the Australian Government Department of the Environment.

This Public Report is available for viewing and downloading from the NICNAS website or available on request, free of charge, by contacting NICNAS. For requests and enquiries please contact the NICNAS Administration Coordinator at:

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**Director
NICNAS**

March 2016

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SUMMARY

The following details will be published in the NICNAS *Chemical Gazette*:

ASSESSMENT REFERENCE	APPLICANT(S)	CHEMICAL OR TRADE NAME	HAZARDOUS SUBSTANCE	INTRODUCTION VOLUME	USE
PLC/1339	Sharp Corporation of Australia Pty Ltd	1,4-Benzenedicarboxylic acid, polymer with 1,3-dihydro-1,3-dioxo-5-isobenzofurancarboxylic acid, hexanedioic acid, α,α' -[(1-methylethylidene)di-4,1-phenylene]bis[ω -hydroxypoly(oxy-1,2-ethandiyl)], α,α' -[(1-methylethylidene)di-4,1-phenylene]bis[ω -hydroxypoly[oxy(methyl-1,2-ethandiyl)]] and 1,2-propanediyl, benzoate.	No	≤ 10 tonnes per annum	Component of printer toner

CONCLUSIONS AND REGULATORY OBLIGATIONS

Human Health Risk Assessment

Based on the assumed low hazard and the assessed use pattern, the notified polymer is not considered to pose an unreasonable risk to the health of workers and the public.

Environmental Risk Assessment

Based on the assumed low hazard and the assessed use pattern, the notified polymer is not considered to pose an unreasonable risk to the environment.

Health and Safety Recommendations

- 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.

- Service personnel should wear disposable gloves and ensure adequate ventilation is present when removing spent printer cartridges containing the notified polymer and during routine maintenance and repairs.
- A copy of the (M)SDS should be easily accessible to employees.
- If products and mixtures containing the notified polymer are classified as hazardous to health in accordance with the *Globally Harmonised System of Classification and Labelling of Chemicals (GHS)*, as adopted for industrial chemicals in Australia, workplace practices and control procedures consistent with provisions of State and Territory hazardous substances legislation should be in operation.

Disposal

- Where reuse or recycling are not appropriate, dispose of the notified polymer in an environmentally sound manner in accordance with relevant Commonwealth, state, territory and local government legislation.

Emergency Procedures

- Spills and/or accidental release of the notified polymer should be handled by physical containment, collection and subsequent safe disposal.

Secondary Notification

This risk assessment is based on the information available at the time of notification. The Director may call for the reassessment of the polymer under secondary notification provisions based on changes in certain circumstances. Under Section 64 of the *Industrial Chemicals (Notification and Assessment) Act (1989)* the notifier, as well as any other importer or manufacturer of the notified polymer, have post-assessment regulatory obligations to notify NICNAS when any of these circumstances change. These obligations apply even when the notified polymer is listed on the Australian Inventory of Chemical Substances (AICS).

Therefore, the Director of NICNAS must be notified in writing within 28 days by the notifier, other importer or manufacturer:

- (1) Under Section 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 Section 64(2) of the Act; if
 - the function or use of the notified polymer has changed from component of printer toner, or is likely to change significantly;
 - the amount of notified polymer being introduced has increased, or is likely to increase, significantly;
 - the notified polymer has begun to be manufactured in Australia;
 - additional information has become available to the person as to an adverse effect of the notified polymer on occupational health and safety, public health, or the environment.

The Director will then decide whether a reassessment (i.e. a secondary notification and assessment) is required.

(Material) Safety Data Sheet

The (M)SDS of the notified polymer was provided by the applicant. The accuracy of the information on the (M)SDS remains the responsibility of the applicant.

ASSESSMENT DETAILS

1. APPLICANT AND NOTIFICATION DETAILS

Applicants

Sharp Corporation of Australia Pty Ltd (ABN: 40 003 039 405)
1 Huntingwood Drive
HUNTINGWOOD NSW 2148

Exempt Information (Section 75 of the Act)

No details are claimed exempt from publication.

2. IDENTITY OF POLYMER

Marketing Name(s)

EXH-514

Chemical Name

1,4-Benzenedicarboxylic acid, polymer with 1,3-dihydro-1,3-dioxo-5-isobenzofurancarboxylic acid, hexanedioic acid, α,α' -[(1-methylethylidene)di-4,1-phenylene]bis[ω -hydroxypoly(oxy-1,2-ethandiyl)], α,α' -[(1-methylethylidene)di-4,1-phenylene]bis[ω -hydroxypoly[oxy(methyl-1,2-ethandiyl)]] and 1,2-propanediyl, benzoate.

CAS Number

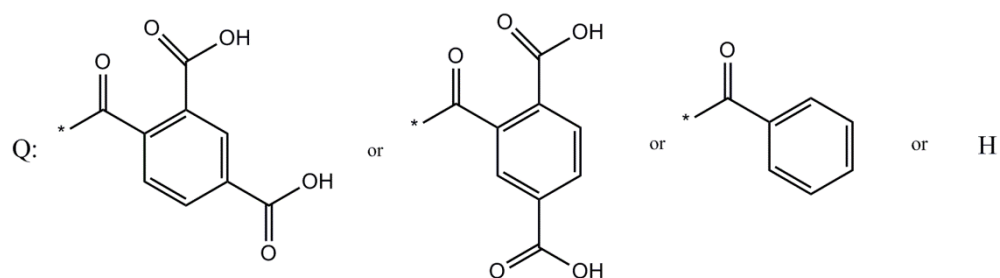
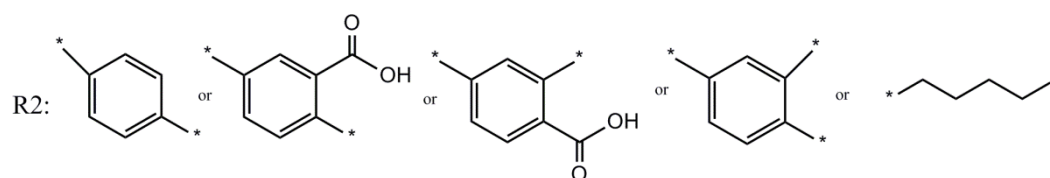
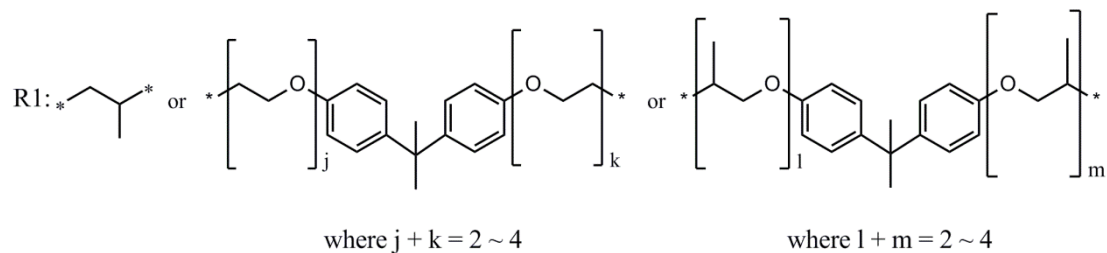
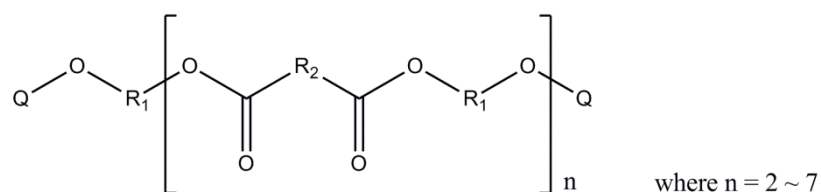
1401453-42-6

Other Name(s)

None.

Molecular Formula

$(C_9H_4O_5.C_8H_6O_4.C_6H_{10}O_4.C_3H_8O_2.(C_3H_6O)_n(C_3H_6O)_nC_{15}H_{16}O_2.(C_2H_4O)_n(C_2H_4O)_nC_{15}H_{16}O_2)_x \cdot xC_7H_6O_2$

Structural Formula**Molecular Weight**

Number Average Molecular Weight (Mn)	2,909 Da
Weight Average Molecular Weight (Mw)	31,054 Da
Polydispersity Index (Mw/Mn)	10.675
% of Low MW Species < 1000 Da	7.59%
% of Low MW Species < 500 Da	3.06%

Polymer Constituents

<i>Chemical Name</i>	<i>CAS No.</i>	<i>Weight % starting</i>	<i>Weight % residual</i>
1,4-Benzenedicarboxylic acid	100-21-0	59.7	0.05
Benzoic acid	65-85-0	5.3	0.01
Hexanedioic acid	124-04-9	0.2	0.01
1,2-Propanediol	57-55-6	29.2	0.3
Poly(oxy-1,2-ethanediyl), α,α' -[(1-methylethylidene)di-4,1-phenylene]bis[ω -hydroxy-	32492-61-8	0.2	0
Poly[oxy(methyl-1,2-ethanediyl)], α,α' -[(1-methylethylidene)di-4,1-phenylene]bis[ω -hydroxy-	37353-75-6	4.0	0.5
5-Isobenzofurancarboxylic acid, 1,3-dihydro-1,3-dioxo-	552-30-7	1.5	0.1

3. PLC CRITERIA JUSTIFICATION

<i>Criterion</i>	<i>Criterion met</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. PHYSICAL AND CHEMICAL PROPERTIES

Appearance at 20 °C and 101.3 kPa	Pale yellow powder
Melting Point/Glass Transition Temp	63.8 °C
Density	1.2 kg/m ³ at 25 °C
Water Solubility	0.0215 g/L at 20 °C
Dissociation Constant	Expected to be ionised under environmental conditions (pH 4-9)
Particle Size	< 5% is < 75 μ m, ~30% < 180 μ m.
Reactivity	Stable under normal environmental conditions
Degradation Products	None under normal conditions of use

5. INTRODUCTION AND USE INFORMATION**Maximum Introduction Volume of Notified Chemical (100%) Over Next 5 Years**

<i>Year</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>
Tonnes	< 1	< 5	< 10	< 10	< 10

Use

The notified polymer will be used as a component of toner (at a concentration of up to 100%) for use in commercial printers. The toner (containing the notified polymer) will be imported in sealed cartridges. No manufacture, reformulation or repackaging will occur in Australia.

6. HUMAN HEALTH RISK ASSESSMENT

No toxicological data were submitted. The notified polymer meets the PLC criteria and is therefore assumed to be of low hazard. The risk of the notified polymer to occupational and public health is not considered to be unreasonable given the assumed low hazard and the assessed use pattern.

Although not considered in this risk assessment, NICNAS notes that the notified polymer contains residual monomers that are classified as hazardous according to the *Globally Harmonised System of Classification and Labelling of Chemicals (GHS)*, as adopted for industrial chemicals in Australia. These are not present in the notified polymer as introduced above the cut off concentrations for classification.

The particle size of the notified polymer is given as 0 – 2,000 µm. Based on the data submitted, it is estimated that < 5% of the notified polymer is < 75 µm. Therefore, less than 5% of the notified polymer is expected to be respirable (< 10 µm). The notified polymer is moderately water soluble and therefore if inhaled at low levels is likely to be cleared from the upper respiratory tract readily through mucociliary action. Small proportions of the notified polymer may reach the lower respiratory tract, but it should still be readily cleared from the lungs unless high levels are inhaled. When high concentrations of the notified polymer are inhaled, it is likely to be cleared from the lungs, but this may be slower and temporary respiratory impairment is possible. The risk of inhalation exposure (and hence the risk of temporary lung overloading) to the notified polymer is expected to be reduced through the use of engineering controls and presence of good general ventilation in areas containing printing machines.

7. ENVIRONMENTAL RISK ASSESSMENT

No ecotoxicological data were submitted. Anionic polymers are generally of low toxicity to fish and daphnia. However, they are known to be moderately toxic to algae with over-chelation of nutrient elements needed by algae for growth as the mode of toxic action. The highest toxicity is expected when the acid is on alternating carbons of the polymer backbone, which may occur on the notified polymer. However, the toxicity to algae is likely to be reduced due to the presence of calcium ions in environmental waters which will bind to the functional groups.

The notified polymer will be imported into Australia as a component of printer toner in sealed containers or cartridges for commercial-use only printing onto paper substrates. Spills or accidental leaks of the product containing the notified polymer are expected to be collected using adsorbents and disposed of to landfill in accordance with local government regulations. It is assumed that 50% of the printed paper will end up in landfill, and the rest will undergo paper recycling processes.

During recycling processes, waste paper is repulped using a variety of chemical agents which, amongst other things, enhance detachment of inks from the fibres. Waste water containing the notified polymer will be released to sewer; during the de-inking process, the cured ink containing the notified polymer may be released into supernatant waters based on its solubility in water. However, based on its high molecular weight and anionic properties, up to 50% of the notified polymer is expected to adsorb to sludge and sediment sewage treatment plant (STP) processes (Boethling and Nabholz, 1997); with the sludge eventually disposed of to landfill or re-used for soil remediation. Under a worst case scenario, it is assumed that all of the notified polymer bound to printed paper will enter sewers during recycling processes (i.e. 50% of the import volume), with no removal during STP processes. The resultant Predicted Environmental Concentration (PEC) in sewage effluent on a nationwide basis over 260 working days per year is estimated at 4.252 µg/L [PEC river = 19.23 kg notified polymer/day ÷ (200 L/person/day × 22.613 million people) × 1 (dilution factor)]. This PEC is below the EC50 for algae of the most toxic anionic polymers (EC50 > 1 mg/L). Based on its high molecular weight and low water solubility, the notified polymer in landfill and in surface waters is not expected to cross biological membranes, and is therefore unlikely to bioaccumulate.

All wastes, including container residues, accidental spill waste, and sludge waste from paper recycling, are expected to be disposed of to landfill in accordance with local government regulations. Based on its high molecular weight and chemical structure, the notified polymer is not expected to be readily biodegradable. In landfill, the notified polymer is expected to eventually degrade by biotic and abiotic processes to form water and oxides of carbon.

Therefore, based on its assumed low hazard and assessed use pattern, the notified polymer is not considered to pose an unreasonable risk to the environment.