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10 May 2002

**NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION  
AND ASSESSMENT SCHEME**

**FULL PUBLIC REPORT**

**PLASDIC KZ-142**

This Assessment has been compiled in accordance with the provisions of the *Industrial Chemicals (Notification and Assessment) Act* 1989 (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 National Occupational Health and Safety Commission which also conducts the occupational health & safety assessment. The assessment of environmental hazard is conducted by the Department of the Environment and the assessment of public health is conducted by the Department of Health and Ageing.

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Director  
Chemicals Notification and Assessment

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## **FULL PUBLIC REPORT**

### **PLASDIC KZ-142**

#### **1. APPLICANT**

Panasonic Australia Pty Ltd of Austlink Corporate Park, 1 Garigal Road, Belrose NSW 2085 has submitted a notification statement in support of their application for an assessment certificate for the synthetic polymer of low concern (PLC) 'PLASDIC KZ-142'.

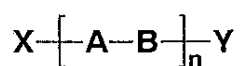
#### **2. IDENTITY OF POLYMER**

**Chemical name:** 1,4-Benzenedicarboxylic acid, polymer with 1,2-ethanediol, 2,2-dimethyl-1,3-propanediol and 2,2'-oxybis[ethanol]

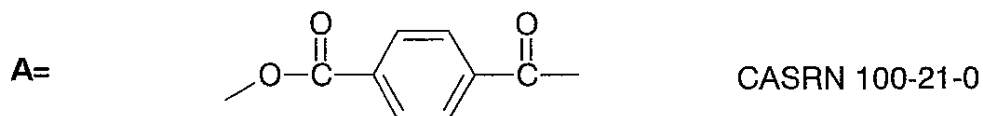
**Other Name:** Modified polyester  
PLASDIC KZ-142

**CAS number:** 132354-80-4

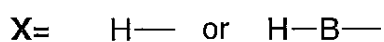
**Molecular formula:** Not provided  
**Structural formula:**



where



or



**Reactive functional groups:** Only low concern groups

**Functional group equivalent weight (FGEW):** more than 100,000 for epoxy group

**Molecular weight (MW):**

Number-average MW	Weight-average MW	% MW < 1000	% MW < 500	Method
3600	339000	4.61	2.8	GPC

**Structural identification method:** Infra Red

**Peaks at** 2865, 2825, 1720, 1610, 1560, 1410, 1360, 1260, 1120, 110, 1020, 720 /cm.

### 3. POLYMER COMPOSITION AND PURITY

Purity: >99%

#### Polymer constituents

Constituent	CAS no.	% Weight	Maximum weight % of residual monomers
1,4-Benzendicarboxylic acid	100-21-0	62.0	0.01
1,2-Ethanediol	107-21-1	9.5	0.005
1,3-Propanediol, 2,2-dimethyl-	126-30-7	19.5	0.005
Ethanol, 2,2'-oxybis	111-46-6	4.0	0.005

**Hazardous impurities (other than residual monomers and reactants):** None

**Non-hazardous impurities at 1% by weight or more:** <1%

**Additives/adjuvants:**  
None

### 4. PLC JUSTIFICATION

The notified polymer meets the PLC criteria.

### 5. PHYSICAL AND CHEMICAL PROPERTIES

Property	Result	Comments
<b>Appearance</b>		Fine black powder (source: MSDS)
<b>Melting point</b>	>130°C	
<b>Specific gravity</b>	1.2	
<b>Vapour pressure</b>	Very low	
<b>Water solubility</b>	<1 µg/L	Not soluble. The polymer is a partially cross-linked water insoluble polymer.
<b>Particle size</b>	0.3 ~ 3 mm	Final product (KK-17 Toner) Distribution (50%)=9-10 µm Approx. 1% less than 4 µm

		Approx. 1% above 16 $\mu$ m
<b>Flammability</b>		Not flammable- Combustible
<b>Autoignition temperature</b>	No data	
<b>Explosive properties</b>	Not explosive	Possible dust explosion if dispersed in air in large quantities
<b>Stability/reactivity</b>	Not reactive	No functional groups are intended or can undergo further reactions
<b>Hydrolysis as function of pH</b>		Negligible between pH 1.2 and 9.0.
<b>Partition coefficient</b>		Not determined. According to the notifier, the substance is also not soluble in n-octanol.
<b>Adsorption/desorption</b>		Not determined. The polymer is water insoluble and therefore is expected to immobile in soils.
<b>Dissociation constant</b>		Not determined. The notified polymer does not contain any functional groups that would be expected to dissociate in water.

## 5.1 Comments on physical and chemical properties

Water solubility was determined by placing 1 mg of polyester into 1000 mL of water, allowing it to stand for 7 days at room temperature (10-25 °C), and then observing whether the particles of polyester remained intact. The notified polymer was observed to maintain its shape in water.

Hydrolysis as a function of pH was measured at pH 1.2, 4, 7 and 9. The notified polymer was first crushed and sieved to a particle size between 83 and 150 mesh. Two replicate samples, each containing 3 grams of polymer, and 30 mL of buffer solution (adjusted to the required pH) were placed in a water bath held at a temperature of 40° C. The flasks were shaken for 14 days (pH 4, 7, 9) and 2 days (pH 1.2), respectively. The polymer was subsequently filtered from the buffer mixture, dried and weighed to calculate weight percentages lost. Reference samples were also prepared in the same manner using 30 mL of water and without shaking. The molecular weight distribution of the dried polymer was measured by GPC to compare to the reference samples. The results showed negligible decomposition within the pH ranges tested.

## 6. USE, VOLUME AND FORMULATION

### Use:

The notified polymer will be used as a component (up to 80%) of toner for use in LED printers (facsimile).

During use, the toner is transferred from the cartridge to paper to be melted to fix to paper by the heat roller fixing apparatus in the facsimile. The notified polymer enables the toner to fix firmly to the surface of paper.

### Manufacture/Import volume:

The polymer will not be manufactured in Australia. Up to 900 kg of notified polymer will be imported for each of the first five years.

Year	2001	2002	2003	2004	2005
Volume Kg	250	350	600	750	900

### Formulation details:

There will be no formulation or repackaging of the notified polymer. It will be imported prepacked in cartridges (174 cm<sup>3</sup>) for direct installation into fax machines.

## 7. OCCUPATIONAL EXPOSURE

Exposure route	Exposure details	Controls indicated by notifier
<b>End use</b>		
<i>Facsimile service personnel (expected to be a small number) and office workers</i>		
Inhalation and dermal	Replacement of a toner cartridge and a drum cartridge, and cleaning of the inside of a facsimile,	Toner is contained within a cartridge and is installed in the printer (facsimile). The cartridge is not normally opened. After use, the toner is firmly fixed to the surface of the paper. Service personnel usually receive training on the handling of toners and toner cartridges. Office personnel are likely to work in a ventilated area. Personal protective equipment is not usually worn by maintenance and service personnel.
<b>Transport and storage</b>		
	Notified polymer is transported within a cartridge containing toner, so contact is unlikely to occur except in the event of a spill.	The notified polymer will be imported in cartridges (up to 80%) and will not be opened under normal circumstances.

## **8. PUBLIC EXPOSURE**

At all stages in the acquisition and use of the toner containing the notified polymer, human contact with the notified polymer is minimised. It is imported as a component of toner in a cartridge and remains there until its imprinting on paper or its lodgement in the plastic waste case. The public may be exposed to the notified chemical via dermal contact through spillage of toner during the changing of printing cartridges and plastic toner waste cases. Such contact will be infrequent and transient. Eye contact and inhalation of fine powder or heated toner vapours is possible but much less likely. On printed paper the notifiable chemical is not transferable to human skin. The potential for public exposure to the notified polymer is therefore minimal.

## **9. ENVIRONMENTAL EXPOSURE**

### **9.1. Release**

No release is anticipated during transport, storage or installation as the toner is housed in sealed cartridges designed to prevent release.

No release of the polymer is expected during use. Under normal use the toner is transferred onto the surface of a sheet of paper where it is firmly fixed to the surface by heat. The notifier indicates that from 10-20% of toner containing the notified polymer may remain on the surface of the photosensitive drum without transferring to paper. This toner is scraped off the drum surface by a blade cleaner and deposited into a waste toner unit installed in the cartridge. The waste toner and cartridges are expected to be disposed of in normal office garbage.

### **9.2. Fate**

Because most of the notified polymer will be bound to printed paper, its fate will be dictated by paper disposal trends. The three main routes of paper disposal are landfill, incineration and recycling. Recent literature suggests that current paper recycling rates in Australia are 70-92% (Australian Environmental Review, 2001). Consequently, most of the paper containing the notified polymer could be recycled.

Paper recycling is carried out in paper mills, where it is likely that at least primary sedimentation occurs, and with some facilities also having biological treatment facilities. The notified polymer is not water soluble, and therefore, in these facilities is expected to partition into sludge, and eventually be disposed of in landfill with other waste sludge. In landfill, the substance is expected to be immobile.

The notified polymer does not readily hydrolyse under normal pH and temperature extremes found in the environment. However, it is anticipated that prolonged residence in an active landfill will eventually degrade the notified substance contained in sludge or in paper disposed of directly through normal garbage.

Incineration of the waste paper will destroy the compound with the generation of water vapours and oxides of carbon.



During normal use, the polymer is not expected to enter the aquatic environment. In any case, the polymer's high molecular weight will preclude absorption across biological membrane. Hence the substance is not expected to bioaccumulate.

## **10. EVALUATION OF HEALTH EFFECTS DATA**

No toxicological data were submitted. The MSDS for PLASDIC KZ-142 indicated that contact with the skin may cause irritation or rash and eye contact may cause slight irritation or redness.

## **11. EVALUATION OF ENVIRONMENTAL EFFECTS DATA**

No ecotoxicological data were provided.

## **12. ENVIRONMENTAL RISK ASSESSMENT**

Most of the notified polymer will be bound to printed paper, which will be either buried in landfill, incinerated, or recycled. A small amount of the polymer may enter landfill directly, housed in waste toner units, when spent cartridges are disposed of with normal office garbage.

When the paper is recycled, the notified polymer will partition into sludge and be disposed to landfill with waste sludge. Due to the low water solubility of the notified polymer, it is expected that the bulk of it will remain bound to soils and not be available to the environment. Incineration of paper/toner wastes will generate oxides of carbon and water, which do not present a significant environmental risk.

During normal use, the polymer is not expected to enter the aquatic environment. In any case, the polymer's high molecular weight will preclude absorption across biological membrane. Hence the substance is not expected to bioaccumulate.

Given these considerations, the overall environmental risk presented by the importation of the notified polymer is low.

## **13. HEALTH AND SAFETY RISK ASSESSMENT**

### **13.1. Hazard assessment**

No toxicological information has been provided for PLASDIC KZ-142. However, the notified polymer has a high molecular weight and is unlikely to penetrate biological membranes. Its chemical structure also suggests that the polymer has a low toxicity viz; a lack of reactive functional groups, lack of charged groups, lack of solubility in water, non-cationic in the pH range 4-9 and high stability. It contains no reactive functional groups and no residual monomers. The polymer meets the PLC criteria and is unlikely to be a hazardous substance according to the NOHSC *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 1999).

The MSDS for KK-17 Toner (approximately 40% notified polymer) indicated that minimal respiratory tract irritation may occur. The product may cause eye irritation, but is non irritating to skin. The particle size for the toner indicates that exposure to generated dust may cause respiratory irritation. The toner is not classified as hazardous according to the National Occupational Health and Safety Commission's (NOHSC) *Approved Criteria for Classifying Hazardous Substances* (NOHSC 1999).

The form of the toner is powder and the particle size distribution is 9 to 10 µm (respirable). The toner can be considered a nuisance dust and employers are responsible for maintaining atmospheric levels of toner dust below the NOHSC exposure standard of 10 mg/m<sup>3</sup> Time Weighted Average (TWA) (NOHSC, 1995). Australia does not have an exposure standard for respirable dust, however, the ACGIH Threshold Limit Value is 3 mg/m<sup>3</sup> TWA (ACGIH, 2001).

### **13.2. Occupational health and safety**

Exposure to toner containing the notified polymer may occur when replacing toner cartridge and drum cartridge and when cleaning the inside of the facsimile. Transport and storage of the toner cartridge is unlikely to result in worker exposure except in the event of accidental spillage.

Service personnel and office staff performing replacement of a toner cartridge and drum cartridge containing toner waste are not expected to be exposed directly to the notified polymer as it is contained within a sealed container. However, contact with the toner on the skin or eyes may cause irritation. Upon application to the paper, the toner is fused to the surface and release is unlikely to occur.

Service personnel may be exposed to the notified polymer when cleaning facsimile equipment.

Noting that the frequency of use is low (1 service/6 months), the risk of adverse health effects to office/service personnel is low and no personal protective equipment is required provided that workers follow proper procedures in handling toner and toner cartridge. Any generation of dust should be avoided.

Cotton or disposable gloves may be worn to prevent skin irritation and workers should avoid any generation of dust when handling the toner.

It is unlikely that the airborne concentration of toner dust in the workplace would warrant exposure monitoring and specific ventilation.

Spilt residues should be swept up manually or using a dust explosion-proof vacuum cleaner and placed within a waste container.

Given these considerations, the polymer will not pose a significant health hazard in the occupational environment.

Workers handling printed paper are not at risk of adverse health effects because the polymer is fixed to the paper and not available for exposure or dermal uptake.

### 13.3. Public health

Public exposure will be limited to transient and infrequent contact if spillage occurs during the changing of cartridges or plastic waste cases. The type of contact will most likely be dermal although minimal eye and inhalation exposure is possible. The low likelihood of contact with the notified polymer and its low toxicity, suggest that it will not pose a significant hazard to public health when used in the proposed manner.

## 14. MSDS AND LABEL ASSESSMENT

### 14.1. MSDS

The MSDS of PLASDIC KZ-142 and KK-17 Toner provided by the notifier were in accordance with the NOHSC *National Code of Practice for the Preparation of Material Safety Data Sheets* (NOHSC, 1994a). They are published here as part of the assessment report. The accuracy of the information on the MSDS remains the responsibility of the applicant.

### 14.2. Label

The label for the toner provided by the notifier was in accordance with the NOHSC *National Code of Practice for the Labelling of Workplace Substances* (NOHSC, 1994b). The accuracy of the information on the label remains the responsibility of the applicant.

## 15. RECOMMENDATIONS

### • *Control Measures*

#### Occupational Health and Safety

No specific control measures are necessary for the notified polymer, however, in the interests of good occupational health and safety practice, the following guidelines are recommended for handling toners containing the notified polymer:

- Avoid generation of dust clouds when handling the toner;
- Service operators should wear cotton or disposable gloves when handling the toner (ie when replacing toner cartridge and drum cartridge containing the notified polymer or when cleaning the inside of a facsimile);
- Spillage of the notified polymer should be avoided. Spillage should be cleaned up promptly with absorbents which should be put into containers for disposal;
- A copy of the appropriate MSDS should be easily accessible to employees.

If products containing the notified chemical are hazardous to health in accordance with the NOHSC *Approved Criteria for Classifying Hazardous Substances*, workplace practices and

control procedures consistent with State and Territory hazardous Substances regulations must be in operation.

### **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 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 any of the circumstances listed in the subsection arise.

The Director will then decide whether secondary notification is required.

## **16. REFERENCES**

ACGIH, 2001; The American Conference of Governmental Industrial Hygienists (ACGIH): Threshold Limit Values for Chemical Substances and Physical Agents and Biological Indices 2001; ACGIH Cincinnati, Ohio.

Australian Environmental Review 16 (1), January 2001, pp. 16

National Occupational Health and Safety Commission (1994a) National Code of Practice for the Preparation of Material Safety Data Sheets [NOHSC:2011(1994)]. Australian Government Publishing Service, Canberra.

National Occupational Health and Safety Commission (1994b) National Code of Practice for the Labelling of Workplace Substances [NOHSC:2012(1994)]. Australian Government Publishing Service, Canberra.

National Occupational Health and Safety Commission (1995) Adopted National Exposure Standards for Atmospheric Contaminants in the Occupational Environment, [NOHSC:1003(1995)]. In: Exposure Standards for Atmospheric Contaminants in the Occupational Environment: Guidance Note and National Exposure Standards. Australian Government Publishing Service, Canberra.

National Occupational Health and Safety Commission (1999) Approved Criteria for Classifying Hazardous Substances [NOHSC:1008(1999)]. Australian Government Publishing Service, Canberra.