

File No: PLC/289

10 May 2002

**NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION
AND ASSESSMENT SCHEME**

FULL PUBLIC REPORT

PLASDIC KZ-100

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.

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, National Occupational Health and Safety Commission, Plaza level, Alan Woods Building, 25 Constitution Avenue, Canberra ACT 2600 between 9am to 5pm Monday to Friday.

Copies of this full public report may also be requested, free of charge, by contacting the Administration Coordinator on the fax number below.

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Director
Chemicals Notification and Assessment

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FULL PUBLIC REPORT**PLASDIC KZ-100****1. APPLICANT**

Panasonic Australia Pty Ltd of Austlink Corporate Park, 1 Garigal Road, Belrose NSW 2085 ~~of (ACN)~~ has submitted a notification statement in support of their application for an assessment certificate for the synthetic polymer of low concern (PLC) 'PLASDIC KZ-100'.

2. IDENTITY OF POLYMER

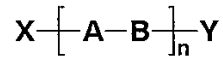
Chemical name: 1,4-Benzenedicarboxylic acid, polymer with (chloromethyl) oxirane, 2,2-dimethyl-1,3-propanediol, 1,2-ethanediol, 4,4'-(1-methylethylidene) bis-[phenol] and oxiranylmethyl neodecanate

Other Name: Modified polyester
PLASDIC KZ-100

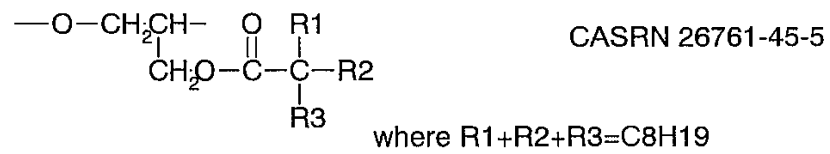
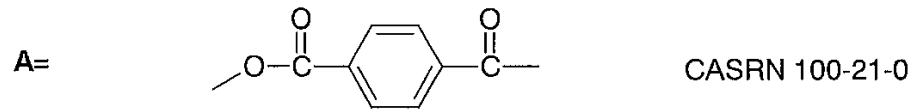
CAS number: 287105-13-9

Molecular formula: Not provided

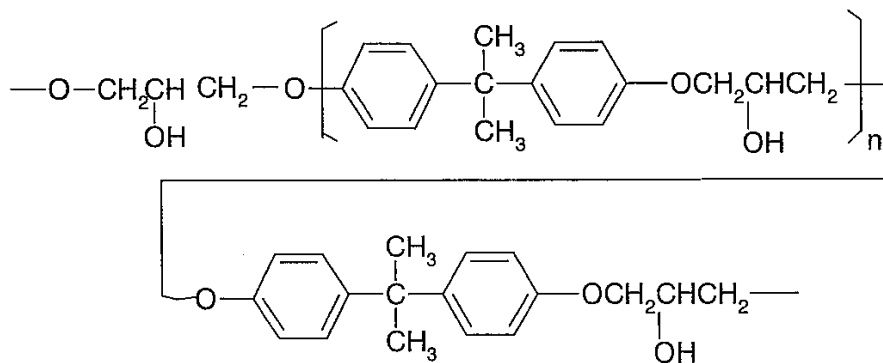
Structural formula:



where



or
CASRN 25068-38-6



X= H— or H—B— Y= —OH or —A—OH

Reactive functional groups: Only low concern groups

Functional group equivalent weight (FGEW): not applicable:

~~— List in this section the reactive functional groups in the polymer and their category of concern, e.g. epoxide (high).~~

Functional group equivalent weight (FGEW):

Molecular weight (MW):

~~Tabulate the molecular weight details from the data provided by the notifier, e.g. the GPC test report.~~

Number-average MW	Weight-average MW	% MW < 1000	% MW < 500	Method
4,000	215000	4.4	2.6	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-Benzenedicarboxylic acid	100-21-0	61.0	0.01
1,2-Ethanediol	107-21-1	11.5	0.005
1,3-Propanediol, 2,2-dimethyl-	126-30-7	19.0	0.005
Neodecanoic acid, oxiranylmethyl ester	26761-45-5	3.0	0.001
Phenol, 4,4'-(1-methylethylidene) bis-, polymer with (chloromethyl) oxirane	25068-38-6	5.0	0.001

~~In this section, the purity of the polymer is required, not the % in polymer solution or formulation.~~

Hazardous impurities (other than residual monomers and reactants): _____

~~— This section should include basic information about impurities in the polymer which are hazardous substances, e.g. on the NOHSC List of Designated Hazardous Substances (including chemicals with exposure standards). None~~

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

<1%

Additives/adjuvants:

~~— For polymers, this will include chemicals deliberately added to the polymer, e.g. stabilisers added to prevent degradation. For polymers which exist only in solvent solution, i.e. not isolated, the solvent can be included here.~~

None

4. PLC JUSTIFICATION

~~The report should contain evidence that the polymer either (a) meets the PLC criteria or (b) does not meet the criteria but is accepted as a PLC for certain scientific reasons, e.g. % MW < 500 is slightly above the limit but % MW < 1000 is well below. Scientific justification for acceptance (if outside the criteria) is required in the report.~~

The notified polymer meets the PLC criteria.

OR

The notified polymer does not meet the following PLC criteria:

However, it is accepted for assessment as a PLC on the following grounds:

5. PHYSICAL AND CHEMICAL PROPERTIES

~~This table should report the physical and chemical properties of the notified polymer rather than the properties of any formulation containing the polymer. However, in some cases, the polymer itself is not isolated, e.g. if the polymer is manufactured in a solvent solution. In these cases, the properties of the polymer solution can be reported if no data is available for the polymer.~~

~~Some properties in this table are not routinely measured for polymers and are not standard data requirements for a PLC, e.g. vapour pressure, partition coefficient, etc. Report the results if submitted. Otherwise delete from the table.~~

~~For the standard data requirements, enter 'not provided' or 'not determined' if the information has not been provided or the test not conducted.~~

Property	Result	Comments
Appearance		Fine black powder (source: MSDS)
Melting point	>130°C oC	
Specific gravity	1.2	
Vapour pressure	Very low	
Water solubility	<1 µg/L	Not soluble. The polymer is a partially cross-linked water insoluble polymer.
Particle size	mean range % respirable 0.3 ~ 3 mm	Final product (KK-17 Toner) Distribution (50%)=9-10 µm Approx. 1% less than 4 µm Approx. 1% above 16 µm
Flammability		Not flammable- Combustible
Autoignition temperature	No data	
Explosive properties	<u>Not</u> explosive	Possible dust explosion if dispersed in air in large quantities
Stability/reactivity	Not reactive	No functional groups are intended or can undergo further reactions
Hydrolysis as function of pH		Negligible between pH 1.2 and 9.0.

Partition coefficient	Not determined. According to the notifier, the substance is also not soluble in n-octanol.
Adsorption/desorption	Not determined. The polymer is water insoluble and therefore is expected to immobile in soils.
Dissociation constant	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.

~~5.1—Comments on physical and chemical properties~~

~~—Where possible, comments should be entered under ‘Comments’ column above. If discussion in this section, follow same order as in table.~~

~~This section should mention any classification under the Dangerous Goods Code, e.g. flammability. If provided by the notifier, the classification should be checked.~~

6. USE, VOLUME AND FORMULATION

Use:

The notified polymer will be used as a component (up to 80%) of a 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 papers.

Manufacture/Import volume:

The notified 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 repacked in cartridges (174 cm³) for direct installation into fax machines.

~~7. OCCUPATIONAL EXPOSURE~~ **7. OCCUPATIONAL EXPOSURE**

~~This section should list the possible exposure scenarios during the life of the polymer and explain when and how worker exposure might occur. If worker exposure times and frequencies are provided in the notification, then they should be included under 'Exposure details'. The control measures stipulated by the notifier (as distinct from what **should** be used) should also be listed for each work scenario.~~

~~If the numbers of workers exposed are provided by the notifier, enter in the 'Scenario' column, e.g. Formulation (5 plant operators).~~

Exposure route	Exposure details	Controls indicated by notifier
<i>End use</i>		
<i>Facsimile service personnel (expected to be a small number) and office workers</i>		
<u>Inhalation and dermal</u>	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.

Transport and storage

Notified polymer <u>is transported within a cartridge containing toner, so contact is unlikely to occur</u> except in the event of a spill.	The notified polymer will be imported as a component of a toner (up to 80%) in cartridges and will not be opened under normal circumstances.
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8. PUBLIC EXPOSURE (From the TGA report)

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 it is imprinted on paper or lodged in the plastic waste case. The public may be exposed to the notified polymer 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 polymer is not transferable to human skin. The potential for public exposure to the notified polymer is therefore minimal.

9. ENVIRONMENTAL EXPOSURE *(From the EA report)*

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 used cartridges containing the waste toner are expected to be disposed of with 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. Toner cartridges and waste toner are also expected to be landfilled where 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 Material Safety Data Sheet (MSDS) for PLASDIC KZ-100 indicates 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 *(From the EA report)*

No ecotoxicological data were provided.

12. ENVIRONMENTAL RISK ASSESSMENT *(From the EA report)*

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

~~— This section must include a summary of the health and physicochemical effects of the polymer. If applicable, the critical health effect(s) (for the risk assessment) should be identified in this section.~~

~~The classification of products containing the polymer due to the hazards of other chemicals in the products should not be included here, however, if the polymer is manufactured as a solvent solution, e.g. in xylene, it may be appropriate to include the classification of the polymer solution.~~

No toxicological information has been provided for PLASDIC KZ-100. 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 National Occupational Health and Safety Commission's (NOHSC) Approved Criteria for Classifying Hazardous Substances (NOHSC, 1999).

The MSDS for KK-17 Toner (containing 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 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/m³ 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/m³ 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), and the low toxicity of the notified polymer, 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

~~—In some cases, specific comments about the MSDS might need to be mentioned in the assessment report. Otherwise, the following standard words should suffice.~~

The MSDS of PLASDIC KZ-100 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

~~Labels should also be provided by notifiers for PLCs. In some cases, e.g. for cosmetic products including the notified polymer, the following wording for labels may need to be altered as the products would be labelled according to ACCC provisions under the Trade Practices Act. As for MSDS, specific comments might be needed in some cases.~~

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

~~Note—references should not be used in recommendations; all documents referred to in recommendations should be mentioned and referenced in the text of the report.~~

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

~~The references quoted above (and several other standard ones) have been included here; any additional references required should be added.~~

~~The link to Endnote for these references has been removed so that they will not be reformatted when any new bibliography is created, and thus the Endnote source is not needed; however, the new references will need to be put into order by cut and paste.~~

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.