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January 2000

**NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION
AND ASSESSMENT SCHEME**

FULL PUBLIC REPORT

HS-1260P

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Director
Chemicals Notification and Assessment

FULL PUBLIC REPORT**HS-1260P****1. APPLICANT**

Brother International (Australia) Pty Ltd of 7 Khartoum Rd North Ryde NSW 2113 has submitted a Synthetic Polymer of Low Concern notification statement in support of their application for an assessment certificate for HS-1260P.

2. IDENTITY OF THE CHEMICAL

The notifier has not claimed any information to be exempted from publication in the Full Public Report.

Chemical Name: 1,3-benzenedicarboxylic acid, polymer with 1,4-benzenedicarboxylic acid, 1,2-ethanediol and 2,2'-[(1-methylethylidene)bis(4,1-phenyleneoxy)]bis[ethanol]

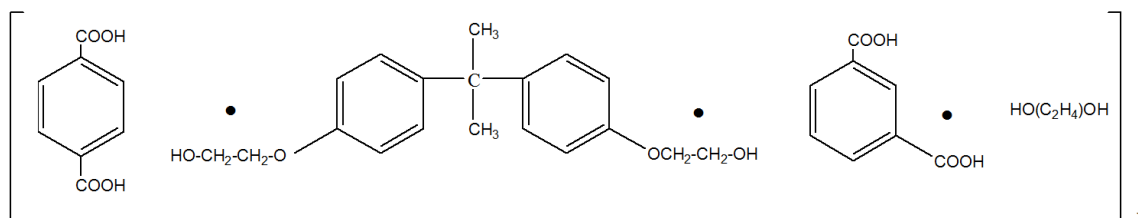
Chemical Abstracts Service (CAS) Registry No.: 41259-36-3

Other Names: isophthalic acid, polymer with terephthalic acid, ethylene glycol and 4,4'-bis(hydroxyethyl)bisphenol A

Marketing Name: HS-1260P

Molecular Formula: $(C_{19}H_{24}O_4 \cdot C_8H_6O_4 \cdot C_8H_6O_4 \cdot C_2H_6O_2)_x$

Structural Formula:



Number-Average Molecular Weight (NAMW): 3450

Weight-Average Molecular Weight: 7690

Polydispersity: 2.23

**Maximum Percentage of Low
Molecular Weight Species**

Molecular Weight < 500: 1.39 %

Molecular Weight < 1 000: 4.85 %

**Weight Percentage of
Ingredients:**

<i>Chemical Name</i>	<i>CAS No.</i>	<i>Weight %</i>
ethanol, 2,2'-[(1-methylethylidene)bis(4,1-phenyleneoxy)] bis-	901-44-0	65.8
1,3-benzenedicarboxylic acid	121-91-5	17
1,4-benzenedicarboxylic acid	100-21-0	17
1,2-ethanediol	107-21-1	0.2

**Method of Detection
and Determination:** infrared spectroscopy

Spectral Data: 3510, 3420, 3040, 2980, 2930, 2870, 1720, 1610, 1585,
1515, 1455, 1410, 1365, 1300, 1210, 1180, 1120, 1100,
1070, 1040, 1020, 935, 875, 830, 595, 575, 555 cm⁻¹

The polymer meets the criteria for assessment as a synthetic polymer of low concern under Regulation 4A of the *Industrial Chemicals (Notification and Assessment) Act 1989*.

3. PHYSICAL AND CHEMICAL PROPERTIES

**Appearance at 20°C
and 101.3 kPa:** odourless white or pale yellow solid

Melting Point: 75 - 80°C

Specific Gravity: 1.2

Vapour Pressure: not determined (see comments below)

Water Solubility: 0.067 mg/L at 25°C

Particle Size: 99.9 % > 250 µm (as prepared)
average 7.7 µm (in toner)

**Hydrolysis as a Function
of pH:** not determined (see comments below)

Dissociation Constant: not determined (see comments below)

Flammability Limits:	not flammable; combustible
Autoignition Temperature:	> 300°C
Explosive Properties:	not explosive
Reactivity/Stability:	stable under normal environmental conditions

Comments on Physico-Chemical Properties

Tests have not been carried out under OECD Good Laboratory Practice Guidelines.

To measure solubility, the test material was placed into an Erlenmeyer flask with distilled water and agitated at room temperature for 24 hours. Water solubility of the test material was then determined gravimetrically. The low solubility of the test material suggests that hydrolysis is unlikely in the environmental pH range despite the presence of ester linkages in the polymer. The K_{ow} value was not determined but it is likely that the polymer will associate with soil and sediments. The notified polymer may have low residual free carboxylic acid functionality, which is likely to have typical acidity, but the low solubility is likely to preclude dissociation.

The Material Safety Data Sheet (MSDS) for the black toner contains no flammability limits but states that the explosion limits for dust in air are similar to those for coal dust.

4. PURITY OF THE CHEMICAL

Degree of Purity: > 99 %

Maximum Content of Residual Monomers:

<i>Chemical Name</i>	<i>CAS No.</i>	<i>Weight %</i>
ethanol, 2,2'-[(1-methylethylidene)bis(4,1-phenyleneoxy)] bis-	901-44-0	0.01
1,3-benzenedicarboxylic acid	121-91-5	0.01
1,4-benzenedicarboxylic acid	100-21-0	0.01
1,2-ethanediol	107-21-1	0.01

Hazardous Impurities:

<i>Chemical name:</i>	stannane, dibutyloxo-
<i>CAS No.:</i>	818-08-6
<i>Weight percentage:</i>	0.05

Regulatory controls: national exposure standard for tin, organic compounds, 0.1 mg/m³ TWA, 0.2 mg/m³ STEL with skin notation (NOHSC, 1995)

Toxic properties: eye, skin and respiratory tract irritant; impairment of central nervous system function possibly resulting in death; liver impairment; suspected cause of birth defects; effects may be delayed (International Chemical Safety Cards, 1999)

**Non-hazardous Impurities
(> 1% by weight):** none

Additives/Adjuvants: the notified polymer will be imported as a component of toner for laser printers; the finished toner will contain a number of other ingredients, particularly pigments

5. USE, VOLUME AND FORMULATION

The notified polymer will be used in electrophotography toner for laser printers. It will comprise up to 80 % of the toner. The notified polymer is a binder resin which will fuse to the paper when heated by the heat roller of the printer.

The notified polymer will be imported as finished toner, packed into cartridges containing 250 g of toner (up to 200 g notified polymer). In Australia, the toner will be transported, stored and handled only in the cartridge prior to end use.

The toner containing the notified polymer is expected to be used in 400 to 500 printers in Australia; the anticipated import volume is 300 kg in the first year of importation, rising to 500 kg in the next four years.

6. OCCUPATIONAL EXPOSURE

The toner containing the notified polymer will be contained in sealed cartridges. No reformulation or repackaging will take place. Hence, no exposure to the notified polymer, or toner, is expected during transportation and storage.

Occupational exposure to the notified polymer in Australia will primarily concern two main worker categories. These are printer service personnel and office staff using printers.

Duties of the service personnel (2 – 4 workers) will include cleaning the inside of the machine, servicing the machine and replacement of toner cartridges. The notifier estimated total exposure time for an individual to be 1 hour per year, based on 120 printers imported per year, a return rate of up to 5 % and 5 to 10 minutes exposure to black toner per service. Both inhalation and dermal exposure to the toner powder may occur during these activities. No protective equipment has been specified for service personnel, although the MSDS recommends the use of gloves to keep hands clean.

The notifier indicates that the toner cartridges are replaced approximately 5 times per year. This will generally be performed by office staff (approximately 400 – 500, based on the number of printers in Australia). To change the toner cartridge of printers, a seal is removed and then the cartridge is placed into the machine. The replacement of the cartridge is anticipated to take around 1 minute per time, and so the estimated total exposure time for an individual worker to replace the toner is 5 minutes per year per machine.

Inhalation and dermal exposure to the toner powder may occur during toner replacement, particularly in the event of a container leak or spill. Office workers would not normally wear protective equipment.

The notifier has not specified which personnel will be involved in changing the waste toner bottle, but it is likely that this will be a task for service personnel. The notifier states that the toner will be tightly packed in the bottle with no leakage in normal use, and therefore exposure during changing the waste toner bottle is likely to be similar to that during servicing the printers.

Exposure may occur upon handling printed matter. However, the toner would not be separately available for exposure or dermal uptake as it is fused and fixed to the printed surface.

7. PUBLIC EXPOSURE

The use of laser printers using the toner containing the notified polymer is likely to normally be in the occupational environment, and there is not likely to be public exposure during transport of sealed toner cartridges or toner waste bottles. Public contact will therefore only occur from touching the fixed toner on paper. The notifier states that the toner is fused to the paper and, under normal conditions, release from the surface is unlikely to occur. Consequently, the potential for public exposure to the notified polymer during all phases of its life cycle is considered to be negligible.

8. ENVIRONMENTAL EXPOSURE

Release

The toner cartridges are fully sealed prior to insertion into copier machines and therefore minimal environmental release is expected prior to use. When the toner is exhausted, the used cartridges are discarded to landfill. The notifier estimates approximately 15 % of toner (containing approximately 80 % of notified polymer) will remain as residue in spent cartridges. Assuming an import volume of 500 kg, this equates to approximately 60 kg being released per annum. Spent cartridges are disposed of to landfill.

Printers designed to use these cartridges also include a waste toner bottle which, when full, is discarded to landfill. These bottles store approximately 120 g of waste toner. However, because several toner types are often used in printers, the notifier estimates that the bottle will contain only 30 - 40 g of the notified polymer. Approximately 20 % (100 kg) of the import volume of the notified chemical will be released in this way.

Release of the notified polymer is also expected to occur at landfill sites where spills and waste paper are discarded. In addition, polymer removed from the paper during recycling is likely to be incorporated with the waste sludge, which will then be discarded to landfill, or incinerated.

Although there is a risk of release of this polymer during transport, the risk of adverse effects to the environment is considered to be low as the polymer is contained in individual, sealed cartridges. Spilt material will be collected and disposed of to either landfill or incineration.

Fate

During recycling, waste paper is pulped and de-inked using a variety of dispersing and wetting agents, organic solvents and bleaches. After pulping, the contaminants and ink are separated from the fibres by pumping the stock through various heat washing, screening, cleaning, flotation and dispersion stages. During these processes there is the potential for hydrolysis of the polymer to occur. Polymer removed from the paper will most likely be incorporated with the sludge remaining from recycling. Sludge is likely to be discarded to landfill or incinerated. Combustion products will be water and oxides of carbon.

Once in landfill, leaching of the notified polymer is unlikely to occur due to the low solubility of the substance. Hydrolysis, although theoretically possible, is unlikely. Any polymer accidentally entering waterways would be expected to settle out onto sediments. The polymer is not expected to cross biological membranes, due to the low solubility and high molecular weight. Therefore the notified polymer is not expected to bioaccumulate.

9. EVALUATION OF TOXICOLOGICAL DATA

No toxicology data were submitted.

10. ASSESSMENT OF ENVIRONMENTAL EFFECTS

No ecotoxicological data were submitted.

11. ASSESSMENT OF ENVIRONMENTAL HAZARD

The low environmental exposure of the polymer as a result of normal use indicates that the overall environmental hazard should be low.

Accidental spills of the polymer, either during replacement of cartridges or during transport are expected to be minimal. Spilt material and polymer remaining in spent cartridges and toner bottles will be disposed of to landfill. Movement of the polymer by leaching from landfill sites is not expected.

Environmental exposure to the notified substance could occur when paper containing the polymer is recycled or otherwise disposed of. The polymer would remain either bound to

waste paper, or to sludge that results from recycling processes, and may be sent to landfill or incinerated.

12. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY EFFECTS

No toxicological information has been provided for the notified polymer and therefore the substance cannot be assessed against the NOHSC *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 1999). The overall toxicity of the notified polymer is expected to be low as it is not highly reactive and, having a high molecular weight would not readily cross biological membranes.

The toner containing the notified polymer will have a uniformly small particle size, with the majority of the particles being in the respirable size range. Work areas around the laser printers should be well ventilated to ensure that the concentration of airborne toner particles is as low as possible.

Occupational Health and Safety

Waterside, warehouse and transport workers will only be exposed to the notified polymer in the event of an accident or damage to packaging. The occupational health risk to these workers is negligible, considering the small quantities in individual toner cartridges and the low hazard presented by the polymer.

The main exposure will be to service personnel while cleaning and servicing the printers, and changing the waste toner bottle. The design of the toner cartridges is such that exposure to the notified polymer should be minimal, and therefore replacement of toner cartridges should not lead to significant exposure. Minor dermal or inhalation exposure may occur if a small quantity of toner is spilt while changing cartridges. The cartridge label and instruction sheet in the carton contain instructions on how to insert a new cartridge.

Office workers are not expected to come into contact with the notified polymer under normal circumstances. Infrequent dermal exposure of end users to the toner containing the notified polymer may occur during changing toner cartridges or clearing paper jams, but the high molecular weight of the notified polymer indicates that dermal absorption would be minimal. There may be a low level of toner dust in the immediate vicinity of printers when they are operating, although inhalation exposure to the notified polymer is expected to pose a low toxicological hazard. Exposure to the notified polymer is not expected to occur once the toner is bound to paper.

Based on the low toxicological hazard presented by the polymer and the expected very low exposures, the health risk posed to office workers by the notified polymer is very low.

Public Health

Public exposure to the notified polymer is possible in the event of an accident during transport and storage, but the likelihood of a substantial spill occurring is low in view of the packaging. The toner containing the notified polymer would normally only be used in occupational settings, and therefore inhalation exposure to toner dust is not likely. Due to the high molecular weight of the notified polymer, percutaneous absorption is unlikely in the case of dermal contact with the toner.

Based on the information provided and the intended use, the notified polymer does not appear to pose a significant risk to public health.

13. RECOMMENDATIONS

To minimise occupational exposure to HS-1260P the following guidelines and precautions should be observed:

- Work areas around printers should be well ventilated. Workers using the product should implement good work practices to avoid spills and the generation of dust;
- Gloves should be worn if direct contact with toner is possible;
- Spillage of the notified polymer should be avoided. Spillages should be swept up promptly and put into containers for disposal;
- Good personal hygiene should be practised to minimise the potential for ingestion;
- A copy of the MSDS should be easily accessible to employees.

14. MATERIAL SAFETY DATA SHEET

The MSDS for the notified polymer was provided in accordance with the *National Code of Practice for the Preparation of Material Safety Data Sheets* (NOHSC, 1994).

This MSDS was provided by the applicant as part of the notification statement. It is reproduced here as a matter of public record. The accuracy of this information remains the responsibility of the applicant.

15. REQUIREMENTS FOR SECONDARY NOTIFICATION

Under subsection 64(1) of the Act, secondary notification may be required if the polymer characteristics cease to satisfy the criteria under which it has been accepted as a Synthetic Polymer of Low Concern. Secondary notification of the notified polymer may be required if any of the circumstances stipulated under subsection 64(2) of the Act arise. No other specific conditions are prescribed.

16. REFERENCES

International Chemical Safety Cards (1999) Di-n-butyltin Oxide. <http://www.cdc.gov/niosh/ipcs/ipcs0256.html>

National Occupational Health and Safety Commission (1994) 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 (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 (1999b) Approved Criteria for Classifying Hazardous Substances [NOHSC:1008(1999)]. Australian Government Publishing Service, Canberra.