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**NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION
AND ASSESSMENT SCHEME**

FULL PUBLIC REPORT

POLYESTER RESIN, OR-951

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Director
Chemicals Notification and Assessment

FULL PUBLIC REPORT
POLYESTER RESIN, OR-951

1. APPLICANT

Océ-Reprographics Limited of 89 Tulip Street, Cheltenham, Victoria 3192 has submitted a limited notification statement with their application for an assessment certificate for the polyester resin, OR-951.

2. IDENTITY OF THE CHEMICAL

Based on the nature of the chemical and the data provided, the polyester resin, OR-951, is considered to be non-hazardous. Therefore, information relating to the chemical identity of the polyester resin, details of the import volume and certain physical and chemical data have been exempted from publication in the Full Public Report and the Summary Report.

Trade name: OR-951

Method of detection and determination:

GPC analysis was used to establish molecular weights and proportions of monomers present. A GPC trace and summary was provided. An Infrared (IR) spectra was provided.

3. PHYSICAL AND CHEMICAL PROPERTIES

Appearance at 20°C and 101.3 kPa:	solid, white or yellow pieces
Odour:	none specified
Melting Point:	120°C
Density:	1.15 kg/m ³
Vapour Pressure:	<0.00001 kPa at 20°C
Water Solubility:	0.002 g L ⁻¹ at 20°C
Fat Solubility:	not provided
Partition Co-efficient (n-octanol/water):	not provided

Hydrolysis as a function of pH:	not provided
Adsorption/Desorption:	not known
Dissociation Constant:	not known
Flash Point:	>100°C
Flammability Limits:	not provided
Combustion Products:	not provided
Pyrolysis Products:	not provided
Decomposition Temperature:	not provided
Decomposition Products:	not provided
Autoignition Temperature:	580°C
Explosive Properties:	not explosive, toner formulation may form explosive dust mixtures
Reactivity/Stability:	very low reactivity
Particle size distribution:	range -not available for notified chemical; imported formulations, either 7-16 µm or 9-21 µm

- **Comments on physico-chemical properties**

The solubility of the polymer has been determined by the column elution method (OECD guidelines) with the polymer coated onto glass beads.

Hydrolysis, Partition Coefficient, Adsorption/Desorption and Dissociation Constant have not been determined due to the low solubility of the polymer. This is acceptable for the following reasons. Polyester resins are subject to hydrolysis of ester linkages only when they are water soluble. The low water solubility of the notified polymer would mean that its hydrolysis potential under the range of environmental pH values would be low.

On the basis of the polymer's low water solubility it is likely to adsorb to, or be associated with soil/sediment and organic matter and be immobile in soil.

The polymer would show typical acidity due to the presence of the residual monomers.

Data on the particle size distribution of the notified chemical were not supplied, more relevant data for the imported formulations was provided instead.

4. PURITY OF THE CHEMICAL

Degree of purity:	99.25%
Toxic or hazardous impurity/impurities:	none known
Non-hazardous impurity/impurities (> 1% by weight):	none known

5. INDUSTRIAL USE

The notified polymer will not be manufactured or reformulated in Australia. The polymer is imported as a component of plain paper copying toner. The concentration of polymer in the two toner formulations imported into Australia is 30 - 60%.

The toners will be imported in sealed polyethylene bottles with contents less than 1 kg.

The toners have been in use for a period of over six months in Europe and the USA.

6. OCCUPATIONAL EXPOSURE

The toner formulations containing the notified polymer are imported in sealed bottles for direct replenishment of photocopiers. The toner formulations contain 30 to 60% of the notified polymer. Exposure during transport and warehousing will only occur during accidental spillage. Twenty storeman will be employed in areas where the formulations are kept. The category of employee likely to have the highest level of exposure are the service technicians potentially exposed during photocopier toner replenishment and maintenance. There will be 50 service technicians who will be exposed to the notified polymer in this way. Exposure of the end user will be limited by the toner refilling process. In some cases only trained technicians can replenish the toner due to technical considerations. The toner refilling process minimises exposure; the polyethylene bottles containing toner are screwed onto the opened toner reservoir and when empty, removed and the reservoir closed. Spillage and/or the release of airborne particles is therefore unlikely.

The particle size range of the imported toner formulations have a high percentage of what is considered as inspirable according to the International Organisation for Standardisation and the American Conference of Governmental Industrial Hygienists (1). The respirable fraction will be negligible according to the Standards Australia definition (1). The applicable standard for workplace exposure is likely to be that for nuisance dusts (1) this is; TWA 10 mg/m³ for inspirable dusts. It should also be noted that there are standards for carbon black and iron oxide; additional components of toners, these are 3 and 5 mg/m³ respectively. Emission measurements in a study undertaken by Océ Nederlands found that the toner dust concentration in the workroom remains below 0.05mg/m³, however as this study was not submitted the veracity of the results cannot be confirmed.

Exposure to the notified polymer via copies is unlikely as the polymer, along with other components of the toner is irreversibly fused to the paper in the photocopying process.

7. PUBLIC EXPOSURE

The notified polymer will be imported into Australia as a component of two formulated toners, packed in polyethylene bottles, the weight of the contents being less than 1 kg. Public exposure is unlikely during refilling, as one model of Océ photocopier can only be filled by an Océ technician, and in the other the toner is discharged into a totally enclosed environment. Public exposure is also unlikely during use, as the toner will be heat fixed to the paper. Residual toner will be contained within plastic containers and disposed of in landfills or by incineration.

8. ENVIRONMENTAL EXPOSURE

Formulation, handling and disposal

Two toners containing the notified polymer are imported in polyethylene bottles containing less than 1 kg. Importation from the Netherlands is mostly by sea freight with occasional small quantities imported by airfreight. There is no re-formulation in Australia. Within Australia, the toners will be transported from the Océ-Australia's central warehouse, first to branch warehouses and then to customers by road. Therefore environmental exposure of the polymer during transport, storage and handling would be minimal except in the case of a major accident.

Toner is added to the photocopier when the display indicates a low toner level. Refilling of some Océ photocopiers with toner will only be undertaken by Océ technicians. With other copiers the toner is added by office staff screwing the sealed toner bottle into the inlet of the holding tank such that the transfer is in a totally enclosed environment. There will be no environmental release during these operations.

Residual toner in empty containers disposed to landfill is estimated at 0.2-0.4%.

Release to the environment may occur during paper recycling and this is explored in the sections that follow.

Environmental Fate

Unless incinerated, the polymer is likely to arrive in a dispersed manner in landfill bound to waste paper. Small quantities will also arrive in landfill as residual toner in empty containers. Polymer disposed to landfill however is unlikely to result in contamination of surface and ground water as its low water solubility and high Log Pow indicate that it will remain immobile in soil.

Combustion of the notified polymer in the presence of excess air will result in products of oxides of carbon and water.

Paper recycling is a growing industry in Australia. Waste paper is repulped using a variety of alkalis, dispersing agents, wetting agents, water emulsifiable organic solvents and bleaching agents. These chemicals enhance the fibre separation, ink detachment from the fibres, pulp brightness and the whiteness of the paper. After pulping, the contaminants and the ink are separated from the fibres by pumping the stock through various heat washing, screening, cleaning, flotation and dispersion stages. The notifier has provided no data on the likely behaviour of the polymer during the recycling process. The hydrolysis of ester linkages under alkaline conditions will be minimal due to the low solubility of the polymer. The polymer therefore is likely to survive the paper recycling conditions, either remaining bound to the pulp or becoming associated with the sludge. In the latter case, the polymer will arrive in landfill where it can be expected to remain intact, or be destroyed through incineration.

9. EVALUATION OF TOXICOLOGICAL DATA

For a synthetic polymer with number-average molecular weight (NAMW) > 1000 toxicology data is not required under the Act. No data was provided by the notifier. The MSDS for the toner formulations containing the notified polymer state that based on toxicological literature on the ingredients (which include carbon black, silica, phenoxy resin and iron oxide) and test results of similar products (none of this information was submitted or reviewed) that ingestion and dermal exposure are unlikely to result in adverse health effects. There may be discomfort to eyes and the upper respiratory system as with nuisance dusts. The high molecular weight, insolubility and other physicochemical attributes of the notified chemical support these conclusions.

Mutagenicity testing of an Océ toner containing 60% of the resin indicated no evidence of mutagenic activity. A human lymphocyte chromosome aberration test of the same toner indicated no chromosome damage.

10. ASSESSMENT OF ENVIRONMENTAL EFFECTS

No ecotoxicological data were provided, which is acceptable for polymers of NAMW > 1000 according to the Act.

The notified polymer is not likely to exhibit toxic characteristics in the environment because large polymers of this nature are not readily absorbed by biota.

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 negligible. The US EPA considers polynonionic polymers with NAMW>1000 and low solubility to be of low concern (2)

Environmental exposure to the notified substance could occur when paper containing the polymer is recycled or disposed of. In each case, the final destination is likely to be landfill where the dispersed polymer can be expected to persist but remain immobile, being either bound to paper or to the sludge from the recycling process.

Accidental spillage of the polymer should result in negligible hazard as it will be marketed in plastic bottles for handling only by specially trained technicians or toner transfer by direct screwing of the bottle into machine.

12. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY EFFECTS

The notified chemical will be imported into Australia in containers for use in photocopiers. There exists little possibility for public exposure to the notified chemical during normal use of the photocopier or by exposure to the photocopied pages. The potential for minor public exposure to the chemical exists during transport, disposal of chemical if accidentally spilt and disposal of used toner. This will be minimised by the use of recommended practices during transportation and waste disposal.

Workplace exposure to the notified polymer will be limited due to the packaging method and the procedure used to replenish photocopiers. Exposure to dust in the vicinity of photocopiers and subsequent inhalation and eye exposure are the most likely occupational hazards. Any dust from the toner will contain the notified polymer as well as the other components of the toner, carbon black and iron oxide. It is highly unlikely that the exposure standard for either of these or that for nuisance dusts will be encountered under normal use and maintenance of copiers. In the event of occupational exposure at levels above the threshold for nuisance dusts (1) there is likely to be respiratory and ocular discomfort. In general occupational exposure and consequential health and safety effects will be limited.

On the basis of the available data the notified chemical, the polyester resin, OR-951 would not be classified as hazardous according to the criteria of Worksafe Australia.

13. RECOMMENDATIONS

To minimise occupational exposure to the polyester resin, OR-951, the following guidelines and precautions should be observed:

- . if engineering controls and work practices are insufficient to reduce exposure to the polyester resin, OR-951, to a safe level, then personal protective devices which conform to and are used in accordance with Australian Standards (AS) for eye protection (AS 1336, AS 1337) (3,4). The appropriate respiratory device should be selected and used in accordance to Australian Standard/New Zealand Standard (AS/NZS) 1715 (5) and should comply to AS/NZS 1716 (6);
- . a copy of the MSDS for the relevant Océ toners should be easily accessible to employees.
- . Implement good work practices to avoid the generation of dusts; avoid spillage.

14. MATERIAL SAFETY DATA SHEET

The MSDS for an Océ toner containing the polyester resin, OR-951, was provided in a format similar to the Worksafe Australia format (7).

This MSDS was provided by Océ-Reprographics Limited as part of their notification statement. The accuracy of this information remains the responsibility of Océ-Reprographics Limited.

15. REQUIREMENTS FOR SECONDARY NOTIFICATION

Under the Act, secondary notification of the polyester resin, OR-951 shall be required if any of the circumstances stipulated under subsection 64(2) of the Act arise. No other specific conditions are prescribed.

16. REFERENCES

1. National Occupational Health and Safety Commission, 1995. *Exposure standards for atmospheric contaminants in the occupational environment*, AGPS, Canberra.
2. Nabholz, J.V., Miller, P., and Zeeman, M. (1993). Environmental Risk Assessment of New Substances under the Toxic Substances Control Act Section Five. In W G Landis, J S Hughes and M A Lewis (Eds), *Environmental Toxicology and Risk Assessment*, American Society for Testing and Materials, ASTM STP 1179, Philadelphia. pp 40-55.
3. Standards Australia, 1994, *Australian Standard 1336-1994, Recommended Practices for Eye Protection in the Industrial Environment*, Standards Association of Australia Publ., Sydney, Australia.
4. Standards Australia, Standards New Zealand 1992, *Australian/ New Zealand Standard 1337-1992, Eye Protectors for Industrial Applications*, Standards Association of Australia Publ., Sydney, Australia, Standards Association of New Zealand Publ. Wellington, New Zealand.
5. Standards Australia, Standards New Zealand, 1994. *Australian/New Zealand Standard 1715 - 1994 Selection, Use and Maintenance of Respiratory Protective Devices*. Standards Association of Australia Publ., Sydney, Australia, Standards Association of New Zealand Publ., Wellington, New Zealand.
6. Standards Australia/ Standards New Zealand, 1991. *Australian/New Zealand Standard 1716 - 1991 Respiratory Protective Devices*. Standards Association of Australia Publ., Sydney, Australia.
7. National Occupational Health and Safety Commission, 1994, *National Code of Practice for the preparation of Material Safety Data Sheets* [NOHSC:2011(1994), AGPS, Canberra.