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**NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION
AND ASSESSMENT SCHEME**

FULL PUBLIC REPORT

Polyester Resin NT-7

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Director
Chemicals Notification and Assessment

FULL PUBLIC REPORT

Polyester Resin NT-7

1. APPLICANT

Hewlett-Packard Australia Limited of 31-41 Joseph Street BLACKBURN VIC 3130 has submitted a limited notification statement in support of their application for an assessment certificate for Polyester Resin NT-7.

2. IDENTITY OF THE CHEMICAL

For the notified chemical, Polyester Resin NT-7, the following items of information are exempt from publication in the Full Public Report and the Summary Report.

Chemical name,
CAS number,
Molecular and structural formulae,
Molecular weight,
Spectral data and
Details of the polymer composition

Other Names: polyester resin

Trade Name: NT-7

Method of Detection and Determination: infrared (IR) spectroscopy and gel permeation chromatography (GPC)

Polyester Resin NT-7 is not considered to be hazardous based on the nature of the chemical and the data provided.

3. PHYSICAL AND CHEMICAL PROPERTIES

Appearance at 20°C and 101.3 kPa: pale yellow powder, slight characteristic odour

Melting Point: 94 - 104 ± 0.5°C

Specific Gravity:	1.2061 at 25.5 ± 0.5°C
Vapour Pressure:	< 6.7 x 10 ⁻⁷ kPa at 25°C
Water Solubility:	< 0.535 mg.L ⁻¹ at 20 ± 0.5°C
Particle size:	mean approx. 200 µm, 1.0% < 10 µm
Partition Co-efficient (n-octanol/water):	not determined (see comments below)
Hydrolysis as a Function of pH:	not determined (see comments below)
Adsorption/Desorption:	not determined (see comments below)
Dissociation Constant:	not determined (see comments below)
Flash Point:	not applicable for solid
Flammability Limits:	not highly flammable
Autoignition Temperature:	not below melting point
Explosive Properties:	not explosive
Reactivity/Stability:	non-oxidising

Comments on Physico-Chemical Properties

Tests were performed according to EEC/OECD test guidelines at facilities complying with OECD Principles of Good Laboratory Practice. Full study reports were submitted.

The water solubility of the polymer was determined by column elution and analysed by spectrophotometry.

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 contains a small amount of free carboxylic acid functionalities, expected to have typical acidity.

4. PURITY OF THE CHEMICAL

Degree of Purity: 99.5%

Hazardous Impurities: the notified chemical contains a compound which has a NOHSC exposure standard; the exposure standard is based on the toxicity of this group of compounds

Non-hazardous Impurities: none

Additives/Adjuvants: none

5. USE, VOLUME AND FORMULATION

The notified polymer will not be manufactured in Australia. NT-7 will be imported as a component (at 5-10%) of a full, formulated toner product ready for use in electrophotocopying machines or electrophoto-graphic printers. The toner in sealed cartridges containing 300 grams of toner (< 30 g of notified polymer) will be mainly used by machines in office environments.

Annual import volumes for the notified polymer will be less than 1 tonne in the first five years.

6. OCCUPATIONAL EXPOSURE

Toner products containing the notified chemical will be imported in the form of pre-packed cartridges containing 300 g of toner. Waterside, warehouse and transport workers are unlikely to be exposed to the notified chemical under normal circumstances.

Office workers may be minimally exposed to the notified chemical during the operation and maintenance of photocopiers, facsimile machines and laser printers which use toner containing the notified chemical. The pre-packaged cartridges are sealed and worker exposure to the contained product should be minimised through use of the replacement procedures recommended by the manufacturer. The toner cartridges are designed so that no release of the contents can occur until a shutter or seal tape is removed, however, dermal exposure may occur if toner containing the notified chemical is spilt while changing cartridges. Spent cartridges are expected to retain approximately 30 g of toner. While replenishing the toner in office equipment, the operator fits the cartridge to the machine and opens the shutter which

allows transfer of the contents to storage within the machine. The mass mean diameter of particles of the notified chemical is 200 µm, however, approximately 1% of particles are less than 10 µm in diameter, that is, approximating the respirable range of 0 to 7 µm (National Occupational Health and Safety Commission, 1995). Particle size data on the product has not been provided, however, as the formulated toner product contains less than 10% of the notified chemical, inhalational exposure to the notified chemical is expected to be low. Contact with paper printed with the toners containing the notified chemical is unlikely to result in dermal exposure, as the notified chemical will be fixed to the paper as part of the toner product.

Office equipment repair personnel have the potential to come into contact with the notified chemical more often than office workers, although exposures are still expected to be controlled, due to the design of the toner cartridges.

7. PUBLIC EXPOSURE

Exposure of the public to the notified chemical will be possible when printed sheets are handled or when toner cartridges are changed. The notified chemical is melted and bonded to the printed paper during the printing process resulting in its immobilisation, and it has a low water (<1 ppm) and octanol solubility, so is unlikely to be bioavailable. Toner cartridges are inserted into printers sealed, with the seal being removed after insertion. Although contact with toner will be possible during the exchange operation the level of exposure under normal circumstances is expected to be low.

In the event of a transport accident dispersion of the toner will be limited due to the packaging of the product in end use containers which will act to contain the extent of a spill. Spilt toner is likely to be susceptible to wind dispersion. As the notified chemical is not water soluble it is unlikely to enter the water supply to any significant extent. Spilt toner can be recovered by sweeping or vacuuming and disposed of according to local regulations.

8. ENVIRONMENTAL EXPOSURE

Release

The toner (with the notified polymer) will be fused to the paper in a water insoluble matrix during printing. This use offers little potential for release into the environment, other than through the disposal of waste paper. When the printer requires more toner, the cartridge is simply replaced. The exchange process is designed to minimise toner losses.

The majority of the notified polymer will be associated with the fused toner and will be strongly bound to the paper. Its release will be associated with the fate of the waste paper.

Empty cartridges are normally expected to be disposed of with general office waste and placed into landfill. However, the notifier has in place a toner cartridge recycling/reuse program.

Collected cartridges are to be shipped overseas. Still, should cartridges be disposed of to landfill, release of toner, albeit minimal, will only occur after destruction of the integrity of the cartridge. The notifier has estimated the amount of toner in the cartridge when it is replaced to be approx. 30 g, or approximately 3.0 g of notified polymer.

Fate

Waste paper disposal is effected either through incineration, recycling or deposition into landfill. Incineration will destroy the compound with the evolution of oxides of carbon and water vapour.

The notifier has provided no data on the likely behaviour of the polymer during the paper recycling process. During such processes, waste paper is repulped using a variety of alkaline, dispersing and wetting agents, water emulsifiable organic solvents and bleaches. These agents enhance fibre separation, ink detachment from the fibres, pulp brightness and the whiteness of paper. It is expected that during this process the material will be either destroyed chemically or, if it survives, be incorporated into waste sludge due to its low solubility. Waste sludge from the recycling plants will be either incinerated or disposed of to landfill, while aqueous waste will be comprehensively treated before discharge.

Some waste paper may be disposed of directly to landfill, and it is anticipated that prolonged residence in an active landfill environment will eventually degrade the notified polymer. The same considerations will apply to waste sludge from paper recycling if disposed of to landfill. Waste toner, e.g. from spillages, will be disposed of to landfill or by incineration. Leaching of the polymer at these sites is unlikely, given the low solubility of the substance. Hydrolysis, although theoretically possible, is also unlikely.

Should the polymer be spilt into waterways, it is not expected to disperse into the water column, but settle out onto sediments. The polymer is not expected to cross biological membranes, due to the low solubility and high molecular weight, and as such should not bioaccumulate (Connell, 1989).

9. EVALUATION OF TOXICOLOGICAL DATA

No toxicology data were provided, however, the submission refers to toxicity results for a similar polyester resin. The results were as follows:

- acute oral toxicity, rat, LD₅₀ > 5 000 mg/kg
- non irritant in rabbit eye irritation study
- non irritant in rabbit skin irritation study
- not a mutagen in a *Salmonella typhimurium* reverse mutation assay

The primary reports were not sighted and the results have not been verified.

The notified chemical contains a compound which is on Schedule 7 of SUSDP and has an exposure standard of time-weighted average (TWA) of 0.1 mg/m³ and short term exposure limit (STEL) of 0.2 mg/m³ in 'Sk' notices (NOHSC, 1995). This is based on their toxicity and they are used as biological control agents.

On the basis of data provided by the notifier including summary information on a similar polyester resin, the notified polymer would not be classified as hazardous according to the NOHSC Approved Criteria (NOHSC, 1994a).

10. ASSESSMENT OF ENVIRONMENTAL EFFECTS

No ecotoxicological data were provided.

11. ASSESSMENT OF ENVIRONMENTAL HAZARD

The majority of notified polymer should not enter the environment until it is incorporated into a polymer matrix when the toner is cured and fixed to paper. Disposal of the waste paper containing the cured toner is normally through landfill, incineration or recycling. In all three cases it is anticipated that the polymer will be destroyed either through the agency of a vigorous chemical environment, or through slow biological or abiotic processes. Even without substantial degradation, the diffuse nature of disposal patterns would indicate slow release into the wider environment.

Accidental spillage of the toner, e.g. during transport, should result in powder wastes being sent to either landfill or incineration facilities. Empty cartridges containing small volumes of toner will either be collected and recycled overseas, or be sent to landfill or for incineration. Movement of the polymer by leaching from landfill sites is not expected.

Considering the above, environmental exposure and the overall environmental hazard is expected to be low.

12. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY EFFECTS

The notified polymer is a polyester resin of high molecular weight with less than 0.5% of low molecular weight impurities and less than 5% of polymers with a NAMW less than 1 000. No toxicology is required for compounds of this type, however summary data has been provided in a Material Safety Data Sheet (MSDS), based on polyester resins of similar composition. The toxicity data indicates that polymers of this type have a low oral toxicity and are not either eye or skin irritants and are non-mutagenic in reverse mutation assays. The finished toner however may be a slight physical irritant to the eyes and upper respiratory tract. The notified polymer contains a single hazardous impurity, the polymerisation catalyst, at less than 0.5% by weight. As this corrosive component will be at less than 0.05%

in the imported product and will be bound in the resin and immobilised during the printing process, the hazard from this compound is likely to be low.

Occupational exposure may potentially occur during replacement of toner in photocopy machines. The use of tape sealed cartridges will limit exposure. A higher level of exposure may occur during maintenance of photocopying equipment however it is very unlikely that the relevant exposure standard (10 mg/m³) will ever be attained. The particle size distribution of the notified polymer indicates that in any event only a very small proportion would be respirable. There is very low risk associated with occupational exposure to the notified polymer. In the event of significant release of toner from a cartridge it would be appropriate to use respiratory and eye protection when cleaning up. This is due to the possibility of eye and respiratory irritation through significant exposure to the imported formulation.

Exposure to the public will occur primarily through contact with printed documents where the polymer and its impurities will be bound to the paper. Therefore, the notified polymer represents a low risk to public health. NT-7 is likely to have low systemic toxicity and irritancy, and is unlikely to be bioavailable.

13. MATERIAL SAFETY DATA SHEET

The MSDS for the toner containing the notified chemical was provided in a format similar to that specified by the *National Code of Practice for the Preparation of Material Safety Data Sheets* (NOHSC 1994b).

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.

14. RECOMMENDATIONS

To minimise occupational exposure to Polyester Resin NT-7 the following guidelines and precautions should be observed:

- Work areas around printers should be well ventilated and good work practices should be implemented to avoid the generation of dusts; such as taking care to avoid contact with the toner adhering to the plastic tape which seals the cartridge and if contact occurs removing toner immediately by washing.
- Spillage of toner products should be avoided and good personnel hygiene should be practiced to minimise the potential for ingestion.
- A copy of the MSDS and/or information about the toners containing Polyester Resin NT-7 should be easily accessible to employees.

15. REQUIREMENTS FOR SECONDARY NOTIFICATION

Under the Act, secondary notification of the notified chemical 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

Connell DW (1989) General characteristics of organic compounds which exhibit bioaccumulation, In Connell DW (Ed) *Bioaccumulation of Xenobiotic Compounds* CRC Press, Boca Raton, USA

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

National Occupational Health and Safety Commission 1994b, *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 Publ., Canberra.