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NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME

FULL PUBLIC REPORT

Polyester Resin CX-F

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 Worksafe Australia which also conducts the occupational health & safety assessment. The assessment of environmental hazard is conducted by the Department of the Environment, Sport, and Territories and the assessment of public health is conducted by the Department of Health and Family Services.

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Director
Chemicals Notification and Assessment

FULL PUBLIC REPORT

Polyester Resin CX-F

1. APPLICANT

IBM Australia Ltd of 55 Coonara Avenue West Pennant Hills NSW 2125 has submitted a limited notification statement in support of their application for an assessment certificate for Polyester Resin CX-F

2. IDENTITY OF THE CHEMICAL

Polyester Resin CX-F is not considered to be hazardous based on the nature of the chemical and the data provided. Therefore the chemical name, CAS number, molecular and structural formulae, molecular weight, spectral data, details of the polymer composition have been exempted from publication in the Full Public Report and the Summary Report.

2. IDENTITY OF THE CHEMICAL

Chemical Abstracts Service (CAS) Registry No.:	not available
Trade Name:	polyester resin CX-F, CXF-6
Number-Average Molecular Weight:	> 1 000
Maximum Percentage of Low Molecular Weight Species	
Molecular Weight < 617:	0%
Molecular Weight < 1 000:	5%

3. PHYSICAL AND CHEMICAL PROPERTIES

Appearance at 20°C and 101.3 kPa:	pale yellow powder
Melting Point:	85 - 103°C

Density:	1 176.4 kg/m^3 at 21°C
Vapour Pressure:	not applicable
Water Solubility:	< 1.5 x 10^{-4} g/L at 20°C (column elution method)
Partition Co-efficient (n-octanol/water):	log P_{ow}> 2.13 at 21.5°C
Hydrolysis as a Function of pH:	not available
Adsorption/Desorption:	not available
Dissociation Constant:	not available
Flash Point:	not available
Flammability Limits:	not highly flammable
Autoignition Temperature:	none below melting temperature
Explosive Properties:	not explosive
Reactivity/Stability:	non-oxidising

Comments on Physico-Chemical Properties

All laboratory tests were carried out under OECD Good Laboratory Practice Guidelines, and according to the requirements of Directives 87/18/EEC and 88/320/EEC.

No information was supplied regarding boiling points. It is unlikely that the substance will boil under ambient conditions and therefore the omission of such data is acceptable.

No information was given on vapour pressure on the grounds that as the notified substance is a polymeric powder, this test is not applicable. This is acceptable.

No data was supplied for hydrolysis, on the grounds that low water solubility prevented testing of this characteristic. The presence of ester linkages in the structure of the polymer indicate that hydrolysis is possible, but this is unlikely under typical environmental conditions.

Adsorption/desorption and dissociation constants were not supplied, as the low solubility of the substance prevented testing of these characteristics. This is acceptable. The polymer may contain a small proportion of free carboxylic acid groups.

4. PURITY OF THE CHEMICAL

Degree of Purity: > 99%

Toxic or Hazardous Impurities:

Chemical name:	dibutylstannane
Synonyms:	di-n-butyltin
	dibutyltin
	dibutyloxostannane
CAS No.:	1002-53-5
Weight percentage:	0.2%
Toxic properties:	organotin compounds have an exposure standard of time-weighted average (TWA) of 0.1 mg/m^3 listed in Worksafe Australia's *Exposure Standards for Atmospheric Contaminants in the Occupational Environment* (1); the basis of this is their toxicity, they are used as biological control agents

The other hazardous impurity according to Worksafe Australia's *List of Designated Hazardous Substances* (2); is an irritant and respiratory sensitiser; the concentration is below the threshold listed in (2).

Non-hazardous Impurities (> 1% by weight): < 0.5%

None of the non-hazardous impurities are listed on Worksafe Australia's *List of Designated Hazardous Substances* (2), Toxline (3) or in Sax and Lewis (4) as having hazardous properties.

Maximum Content of Residual Monomers: 0.7% (see harmful and non-hazardous impurities)

Additives/Adjuvants: none

5. USE, VOLUME AND FORMULATION

The notified polymer will not be manufactured in Australia. It will be imported into Australia as an ingredient of a toner for electrophotocopiers or electrophotographic printers in sealed cartridges. The notified polymer makes up 85 - 95% of the toner.

Import volumes for the notified polymer will range from 1 - 10 tonnes per annum for the first five years.

6. OCCUPATIONAL EXPOSURE

Office workers may be exposed to the toner containing the notified polymer, when replacing spent toner cartridges. The toner cartridges are designed so that no toner escapes until the seal tape is removed after the cartridge is placed in the photocopier or printer. A low level of exposure is possible from toner adhering to the seal tape when a new cartridge is inserted. The release of toner into the atmosphere during this operation is very unlikely.

Exposure during routine maintenance of photocopiers and printers is possible. However, this is expected to occur infrequently and the level of exposure is expected to be minimal. During copying or printing operations the toner will be transferred to the paper and firmly fixed by heat. Exposure to toner in the atmosphere when photocopiers or printers are in use is expected to be low.

7. PUBLIC EXPOSURE

A low level of exposure is possible from toner adhering to the seal tape when a new cartidge is inserted into the photocopier or printer, but release of toner into the atmosphere during this operation is unlikely. Exposure during routine maintenance of photocopiers and printers is also possible. However, the level of exposure is likely to be minimal.

The notified polymer and the toner containing the notified polymer are to be treated as plastic waste and disposed of accordingly.

8. ENVIRONMENTAL EXPOSURE

Release

The notified polymer will be fully imported as a component of toner cartridges, and will not be manufactured, formulated or packaged in Australia.

The toner cartridge is supplied as part of a set of components, including a development unit and other components. When the toner has been consumed in the copying or printing process the whole cartridge is replaced. The cartridge has been designed to limit spills when they are being replaced in copying machines.

The toner is heat fixed to the paper following application. The notifier has given no indication whether the toner will remain fixed to paper during paper recycling processes.

The notifier claims there will be no environmental release of the toner, and thus the notified polymer, as the toner cartridges are fully sealed prior to insertion into copier machines. Accidental spills, if they do occur, are to be collected and disposed of to landfill, or incinerated. These routes are also recommended for disposal of spent toner cartridges.

Fate

Unless incinerated, the most likely route of release of the notified polymer is from landfill sites when spills are disposed of, or when waste paper is dumped. Leaching of the toner/polymer mix is unlikely from these sites, given the low solubility of the substance. Hydrolysis, although theoretically possible, is unlikely. Combustion of the notified polymer in the presence of excess air will result in water and oxides of carbon.

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. 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. During these processes there is the potential for hydrolysis of the polymer to occur, with the possibility of more soluble products being formed. Should the polymer be removed from the paper by such processes, then it will most likely be incorporated with the sludge remaining from recycling, with sludge being placed in landfill, or incinerated. Should importation levels rise above 10 tonnes per annum, the company should clarify both the likely behaviour of the polymer, and hydrolytic potential of the polymer during paper recycling.

The only other potential release of this polymer will occur in the event of transport accidents. Collection of spilt material would again be disposed of to either landfill of incineration.

If the polymer was spilt to waterways, it would not be expected to disperse into the water column, but should 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 substance should not bioaccumulate.

9. EVALUATION OF TOXICOLOGICAL DATA

No toxicological data were supplied and this is acceptable according to the Act for polymers of number-average molecular weight (NAMW) greater than 1 000.

10. ASSESSMENT OF ENVIRONMENTAL EFFECTS

No ecotoxicology data were provided, which is acceptable for polymers of NAMW greater than 1 000 according to the Act.

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. Environmental exposure and the overall environmental hazard should be negligible.

Disposal of the waste paper containing the cured toner is normally through landfill, incineration or recycling. In landfill the toner (and thus notified polymer) should remain fixed to the paper substrate and remain immobile. Incineration products of the notified polymer should not produce an environmental hazard. After the recycling process, the toner will either remain bound to the pulp or become associated with sludge. In the latter case, the final destination is likely to be landfill where the toner can be expected to persist but remain immobile, remaining bound to the sludge. Therefore, the environmental hazard through this exposure is expected to be negligible.

Accidental spillage of the toner, either during replacement of cartridges or during transport, should result in powder wastes being sent to either landfill or incineration facilities. Spent cartridges (not sent for recycling) containing residues of toner are likely to be sent to landfill. Movement of the polymer by leaching from landfill sites is not expected.

12. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY EFFECTS

The notified polymer is not expected to be a health hazard as the high NAMW (NAMW of greater than 1 000) and low water solubility should preclude transmission of molecules across biological membranes. Levels of residual monomers are very low and should not render the polymer a health hazard. There is one notable hazardous impurity, dibutyloxostannane, a poison by ingestion and a skin and eye irritant. This compound is listed in the most restrictive Schedule 7 of the Standard for the Uniform Scheduling of Drugs and Poisons. However, the level (< 0.2%) is not sufficient to render the polymer hazardous (2). The level of low molecular weight (< 1 000) species (5.0%) is also unlikely to render the polymer hazardous. The notified polymer is not classified as hazardous according to the criteria of Worksafe Australia (5).

Occupational exposure to the notified polymer is expected to be minimal since it is imported in robust photocopier and printer toner cartridges and no repackaging occurs. The only significant occupational or public exposure expected is when the

plastic seal is removed after the cartridge is inserted into the machine. However, as this occurs infrequently, is of short duration and the toner will not be released into the atmosphere, exposure is expected to be minimal. Exposure during routine machine maintenance is also expected to be minimal as a result of containment of the toner within the cartridge.

In the case of accidental spillage during transport, the public may be exposed to the notified polymer, Polyester Resin CX-F. This is minimised by the recommended practices for storage and transportation. Emergency procedures for the containment and clean up of accidental spills are available.

The risk of adverse occupational or public health or safety effects resulting from transport, storage, disposal or use of the notified polymer is expected to be minimal.

13. RECOMMENDATIONS

To minimise occupational exposure to Polyester Resin CX-F 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 Material Safety Data Sheet (MSDS) and/or information about the toners containing Polyester Resin CX-F should be easily accessible to employees.

14. MATERIAL SAFETY DATA SHEET

The MSDS for the notified chemical was provided in accordance with the *National Code of Practice for the Preparation of Material Safety Data Sheets* (6).

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 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

1. 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.

2. National Occupational Health and Safety Commission 1994, *List of Designated Hazardous Substances* [NOHSC:10005(1994)], Australian Government Publishing Service Publ., Canberra.

3. Toxline Silver Platter 1995, *Toxline SilverPlatter CD-ROM database, January 1994-December 1995*, Silver Platter International N.V.

4. Sax, N. I. & Lewis, R. J. 1989, *Dangerous Properties of Industrial Materials*, Van Nostrand Reinhold, New York.

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

6. 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.

Attachment 1

The Draize Scale for evaluation of skin reactions is as follows:

Erythema Formation	*Rating*	*Oedema Formation*	*Rating*
No erythema	0	No oedema	0
Very slight erythema (barely perceptible)	1	Very slight oedema (barely perceptible)	1
Well-defined erythema	2	Slight oedema (edges of area well-defined by definite raising	2
Moderate to severe erythema	3	Moderate oedema (raised approx. 1 mm)	3
Severe erythema (beet redness)	4	Severe oedema (raised more than 1 mm and extending beyond area of exposure)	4

The Draize scale for evaluation of eye reactions is as follows:

CORNEA

Opacity	*Rating*	*Area of Cornea involved*	*Rating*
No opacity	0 none	25% or less (not zero)	1
Diffuse area, details of iris clearly visible	1 slight	25% to 50%	2
Easily visible translucent areas, details of iris slightly obscure	2 mild	50% to 75%	3
Opalescent areas, no details of iris visible, size of pupil barely discernible	3 moderate	Greater than 75%	4
Opaque, iris invisible	4 severe		

CONJUNCTIVAE

Redness	*Rating*	*Chemosis*	*Rating*	*Discharge*	*Rating*
Vessels normal	0 none	No swelling	0 none	No discharge	0 none
Vessels definitely injected above normal	1 slight	Any swelling above normal	1 slight	Any amount different from normal	1 slight
More diffuse, deeper crimson red with individual vessels not easily discernible	2 mod.	Obvious swelling with partial eversion of lids	2 mild	Discharge with moistening of lids and adjacent hairs	2 mod.
Diffuse beefy red	3 severe	Swelling with lids half-closed	3 mod.	Discharge with moistening of lids and hairs and considerable area around eye	3 severe
		Swelling with lids half-closed to completely closed	4 severe		

IRIS

Values	*Rating*
Normal	0 none
Folds above normal, congestion, swelling, circumcorneal injection, iris reacts to light	1 slight
No reaction to light, haemorrhage, gross destruction	2 severe