

File No: NA/424

Date: October 1996

**NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION
AND ASSESSMENT SCHEME**

FULL PUBLIC REPORT

MDR-2

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.

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, Worksafe Australia, 92-94 Parramatta Road, Camperdown NSW 2050, between the hours of 10.00 a.m. and 12.00 noon and 2.00 p.m. and 4.00 p.m. each week day except on public holidays.

For Enquiries please contact the Administration Coordinator at:

Street Address: 92 Parramatta Rd Camperdown, NSW 2050, AUSTRALIA

Postal Address: GPO Box 58, Sydney 2001, AUSTRALIA

Telephone: (61) (02) 577-9466 **FAX (61) (02) 577-9465**

Director
Chemicals Notification and Assessment

FULL PUBLIC REPORT**MDR-2****1. APPLICANT**

MITA Copiers Australia of 25 Sirius Road LANE COVE NSW 2066 has submitted a limited notification statement in support of their application for an assessment certificate for MDR-2.

2. IDENTITY OF THE CHEMICAL

MDR-2 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, exact molecular weight, spectral data, details of the polymer composition and details of exact import volume have been exempted from publication in the Full Public Report and the Summary Report.

Trade Name: MDR-2

**Number-Average
Molecular Weight:** > 1000

**Weight-Average
Molecular Weight:** > 1000

**Maximum Percentage of Low
Molecular Weight Species**
 molecular weight < 1000: 0.42%
 molecular weight < 500: 0.30%

**Method of Detection
and Determination:** ultraviolet/visible and infrared spectroscopy

3. PHYSICAL AND CHEMICAL PROPERTIES

**Appearance at 20°C
and 101.3 kPa:** white powder

Softening Point: 120-130°C; MDR-2 decomposes above ~210-230°C at atmospheric pressure

Density: 1100 kg/m³ at 20°C

Vapour Pressure:	< 6×10^{-15} kPa at 25°C (modified Watson correlation)
Water Solubility:	saturation concentration = 260 mg/L at 20°C; content of water extractable parts = 12.8 g/kg (1280 ppm)
Partition Co-efficient (n-octanol/water):	$\log P_{ow} > 6$ (Leo-Hansch calculation)
Hydrolysis as a Function of pH:	not determined
Adsorption/Desorption:	estimated $K_{oc} > 1 \times 10^6$ (by estimation from $\log P_{ow}$)
Dissociation Constant:	not determined
Flash Point:	not determined
Flammability Limits:	highly flammable: fastest burning time over a distance of 100 mm was 31 seconds
Autoignition Temperature:	> 400°C
Explosive Properties:	non-explosive
Particle Size:	median mass diameter: 1.8 μm 84.8% < 10 μm
Reactivity/Stability:	predicted to be non-oxidising; sunlight and temperatures above 50°C will contribute to instability

Comments on Physico-Chemical Properties

Water solubility measured was determined using the new draft solubility/extractability OECD test (1), which gives a measure of solubility for the test material by the amount extracted into double-distilled water. The solubility for this substance seems high given the lack of functionality that might confer such properties to this chemical and the calculated $\log P_{ow}$ and would appear to reflect more soluble low MW impurities.

While it contains ester functionalities the notified substance is not expected to hydrolyse under the expected environmental pH range.

The estimated partition coefficient data and high molecular weight for this polymer suggests that it is not expected to cross biological membranes or to bioaccumulate. The estimation of the ability for adsorption/desorption indicates the notified substance is expected to sorb strongly to soils. There are no dissociable hydrogens

in the notified polymer.

4. PURITY OF THE CHEMICAL

Degree of Purity: 99.9%

Toxic or Hazardous Impurities: the monomers making up the notified polymer are estimated to be present at less than 0.3% from the GPC; one of these is moderately toxic by inhalation and intraperitoneal routes, is an experimental tumourigen and teratogen, exhibits human systemic effects by inhalation, experimental reproductive effects, mutagenic data and skin and eye irritancy (2), may cause sensitisation by skin contact; there are no data for other monomers but some similarities to the above are expected

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

Maximum Content of Residual Monomers: 0.3%

Additives/Adjuvants: none

5. USE, VOLUME AND FORMULATION

The notified polymer is the carrier resin for formulated photocopy developers. It is to be imported at a rate of < 1 tonne per year over the next five years. It is present in photocopy developer at < 3%, the remainder comprising ferrite carrier (> 60%), carbon black (< 1%) and polyester resin (< 5%).

6. OCCUPATIONAL EXPOSURE

The notified chemical is to be imported as a component of photocopy developer in 1.3 kg plastic cartridges (bottles). There is a low probability of exposure during transport and handling in the event of an accident.

Company service engineers replace developer in photocopiers once in 1-3 months per machine. The developing unit (cartridge) in the photocopier is recharged by removal of the unit, discarding spent developer onto a plastic sheet and loading the entire contents of a bottle (1.3 kg) into the cartridge prior to its replacement in the photocopier. Exposure is expected to be low given that each recharge takes about 10 minutes and that a service engineer would spend a total of about 15 hours per year performing these operations.

7. PUBLIC EXPOSURE

No public exposure to the notified polymer is expected to occur during distribution, use in photocopiers or in disposal.

8. ENVIRONMENTAL EXPOSURE

Release

The notifier indicated that the yearly loss from recharging developer cartridges will be negligible. Only trained technicians will recharge developer cartridges, which should help reduce spillages. During the replacing of the developer into the photocopier, the developing unit is turned upside down, and the remaining developer is ejected. Release during this process is typically less than 6.5 g, which is less than 0.2 g of the notified polymer, and will be disposed of to landfill.

Other possible release to the environment will be through spillages upon use of this developer and disposal of the bottles (cartridges) used for transport of the notified chemical. Estimates of wastes from empty developer cartridges (bottles) will be a maximum of 1 kg of notified polymer per year.

Loss of notified substance will also occur via cleaning of the printers using the developer. Printers will be cleaned using water-based solvents and the wastes disposed of according to local regulations. Environmental exposure during the use of these developers from dry process printers is unlikely. As the notified substance has a relatively high molecular weight and low water solubility it is not expected to cross biological membranes nor be bioavailable.

Fate

The fate of most of the notified substance is identical to that of the paper to which it is bound. This paper may be recycled but eventually be disposed of to landfill. Here they would very slowly break down.

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 processes. 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 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.

Treatment and disposal of any spillages and wastes is adequately dealt with in the Material Safety Data Sheet (MSDS).

Bioaccumulation

The waste generated by use of the notified substance will, in the general case, be spills or by refilling of printing cartridges. These wastes will be treated as landfill. Given the water solubility of MDR-2, its log P_{ow} value (> 6) and low aquatic exposure, the potential for bioaccumulation seems negligible.

9. EVALUATION OF TOXICOLOGICAL DATA

Toxicological data are not required for polymers of number-average molecular weight (NAMW) $> 1\,000$ according to the Act and no data were submitted for the notified polymer.

10. ASSESSMENT OF ENVIRONMENTAL EFFECTS

No ecotoxicological data were provided, which is acceptable for polymers with an annual import rate of > 1 tonne and a NAMW > 1000 , according to the Act.

11. ASSESSMENT OF ENVIRONMENTAL HAZARD

The notified substance is unlikely to present a hazard to the environment at any stage of its use. It is expected that negligible amounts will be released during recharging of developer cartridges or cleaning of the photocopying machines. The ultimate fate of the waste developer is treatment by landfill at an approved industrial facility. Leaching of such treated wastes into the soil is not expected.

Each cartridge contains 1 300 g of developer, equivalent to 40 g of the notified polymer. Discarded developer cartridges typically contain less than 0.2 g of the polymer. Less than 1 kg of MDR-2 is expected to end up as landfill through association with disposal of spent cartridges. This equates to a monthly release of less than 100 g, and is spread across many sites, Australia wide.

Replacement of developer is unlikely to occur more than once a month. Discarded waste developer typically contain less than 0.2 g of the polymer. A maximum amount of 600 g of MDR-2 is expected to end up as landfill through association with disposal of spent cartridges. This equates to a monthly release of 50 g, and is spread across many sites, Australia wide.

Because of the relatively small amount being imported and the small amount of release being spread across the country, the environmental hazard of the polymer is rated as negligible.

12. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY EFFECTS

The notified polymer has a NAMW greater than 1 000 and unlikely to be absorbed across biological membranes to cause systemic effects. The levels of low molecular weight species (0.42%) and residual monomers (maximum of 0.3%) would not render the polymer hazardous according to the criteria of Worksafe Australia (3). In addition, the concentration of notified polymer in the formulation to be imported is low (< 3%).

Exposure of workers to the notified polymer during importation, warehousing and handling of containers is likely to occur only in the event of an accident.

Exposure of service engineers to photocopier developer containing the notified polymer is expected to be low given the time taken to recharge the developer cartridge (10 minutes). Accidental spills during this operation are expected to be infrequent. There may be some exposure to developer during cleaning of the machine and machine maintenance but this can be easily avoided by the use of disposable plastic gloves.

Health risks to service engineers involved in developer replenishment and machine maintenance are considered to be negligible given the limited and infrequent exposure coupled with the predicted low hazard of the notified chemical.

13. RECOMMENDATIONS

To minimise occupational exposure to the notified chemical the following guidelines and precautions should be observed:

- Spillage of the notified chemical should be avoided, spillages should be cleaned up and put into containers for disposal;
- Good personal hygiene should be practised to minimise the potential for ingestion;
- A copy of the relevant MSDS 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 Preparation of Material Safety Data Sheets* (4).

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. OECD ENV/MC/CHEM(96)2. Proposal for the Endorsement of Three New Test Guidelines and One Updated Guideline, Submitted to the 24th Joint Meeting, 1996.
2. *Dangerous Properties of Industrial Materials*, 7th Ed., Sax N. I. and Lewis R. J. Sr Eds, Van Nostrand Reinhold, 1989.
3. National Occupational Health and Safety Commission 1994, *Approved Criteria for Classifying Hazardous Substances [NOHSC:1008(1994)]*, Australia Government Publishing Service, Canberra.
4. National Occupational Health and Safety Commission 1994, *National Code of Practice for the Preparation of Material Safety Data Sheets [NOHSC:2011(1994)]*, AGPS, Canberra.